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# A Multi-Disciplinary Approach to Seat Belt Issues

Stephen J. Werber

*Cleveland State University*, [s.werber@csuohio.edu](mailto:s.werber@csuohio.edu)

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# A MULTI-DISCIPLINARY APPROACH TO SEAT BELT ISSUES

STEPHEN J. WERBER

## I. INTRODUCTION

A SCANNER-EQUIPPED HOVER CRAFT dispatched from a Kilkonian<sup>1</sup> space exploration vessel made the following observations as it surveyed events on the planet Earth:

Scanner Operator: Small object, weight approximately three to six units,<sup>2</sup> appears to be a container system bearing a life form. System is moving at a velocity of .03 Klinktares.<sup>3</sup>

Captain: What is the method of container control?

Operator: Purely manual. Control is exercised as a function of what the life form observes through optical and auditory senses.

A few moments later, a further observation takes place:

Operator: A second container system is in view which appears to be similarly controlled but which weighs in the range of four to seven units and has a velocity of .04 Klinktares.

Captain: What are the courses of the systems?

Operator: Intersect is imminent.

Captain: Switch to visual observation screen.

Watching the ensuing intersect, the Captain notes moderate deformation of both container systems. As the deformation proceeds, the life forms apparently attempt to fuse their bodies to the container systems. Although the fusing effort fails, the life forms in both systems show no

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\*Professor of Law, Cleveland State University, Cleveland-Marshall College of Law. B.A., Adelphi Univ.; J.D., Cornell Univ.; LL.M., New York University.

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<sup>1</sup> Kilkonia is a fictional planet beyond the earth's galaxy with an advanced technology.

<sup>2</sup> One Kilkonian unit is approximately equivalent to 1,000 pounds.

<sup>3</sup> A Klinktare is a time unit measure of velocity approximately equivalent to 1,000 miles per hour. The speed of the container system under observation in earth terms was approximately thirty miles per hour.

vital signs one sinter<sup>4</sup> after the intersect. All observations are noted in the Captain's Log and the scan is terminated.

What conclusion might our fictitious Kilkonian visitors draw from their observations? The basic laws of physics indicate that a moving object will continue moving in a straight line at a constant speed until some force either modifies the object's direction or causes it to stop.<sup>5</sup> The occupant of an automobile, although not moving in relation to the vehicle, is moving relative to the ground at a speed equal to that of the vehicle. An inherent awareness of these basic laws of motion would presumably cause one to act so as to preclude or limit the potential of striking the vehicle's interior in the event the automobile decelerates rapidly. An objective observer could conclude that the failure to use a restraint system was intentional and, therefore, the continued forward motion of the vehicle occupant was desired. The ramifications of such a conclusion are mindboggling.

Even before the government mandated,<sup>6</sup> manufacturers researched and developed technology to aid in preventing or significantly reducing automobile-related injuries and deaths. One result was the seat belt restraint system. For over a decade, the benefits of this research and development have been available.

Seat belt restraint systems presently fall into two categories: 1) active, where the vehicle occupant must take some affirmative steps to activate the system, i.e., physically buckle the belt; and 2) passive, where the system is designed to provide automatic application.<sup>7</sup> Either seat

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<sup>4</sup> A sinter is a time measure approximately equivalent to one second.

<sup>5</sup> Newton's First Law of Motion states that a body at rest remains at rest, and a body in motion continues to move at constant speed in a straight line unless the body is acted upon by an unbalanced force. 1 R. RESNICK and D. HALLIDAY, PHYSICS 82 (1966) [hereinafter cited as R. Resnick and D. Halliday].

Newton's Second Law of Motion states that an unbalanced force acting on a body causes the body to accelerate in the direction of the force, proportional to the unbalanced force and inversely proportional to the mass of the body. *Id.* at 85.

The relationship of the basic laws of physics to automobile accidents and safety belts is set forth in NATIONAL HIGHWAY TRAFFIC SAFETY AD. (NHTSA), U.S. DEPT OF TRANSP., PHYSICS AND AUTOMOBILE SAFETY BELTS (1977).

<sup>6</sup> 49 C.F.R. § 571.208 (1979).

<sup>7</sup> One such system, introduced on the Volkswagen Rabbit consists of a shoulder harness, affixed to the car door, which automatically moves into place when the occupant sits down and closes the door. See NATIONAL HIGHWAY TRAFFIC SAFETY AD. (NHTSA), U.S. DEPT OF TRANSP., OCCUPANT PROTECTION PROGRAM PROGRESS REPORT No. 2 29 (1979) [hereinafter cited as PROGRESS REPORT].

Another form of passive restraint system is the air bag. However, its effectiveness and technical integrity have been questioned. See generally U.S. DEPT OF TRANSP., IMPACT TESTS OF A NEAR-PRODUCTION AIR CUSHION RESTRAINT, FINAL REPORT (Synopsis) (1974); PROGRESS REPORT, *supra* this note, at 37; Gaskill, *The Inflatable Occupant Restraint System in the Small Car*, INT'L CONF. ON PASSIVE RESTRAINTS, MILFORD, MICH. 57 (1970); MacKay, *Airbag Effectiveness—A Case for the Compulsory Use of Seat Belts*, FICITA, XIV CONGRESS, LONDON 3/66-3/70

belt restraint system is inexpensive and easy to use. Barring impacts so severe as to cause significant intrusion of the passenger compartment, the systems are remarkably efficient. Seat belts are incorporated into all motor vehicles currently sold for passenger use in the United States and are present in more than ninety-five percent of all passenger vehicles in use in the United States.<sup>8</sup>

To fully appreciate the life-saving and injury-reduction capacity of seat belt restraint systems, it is necessary to examine several non-legal topics which have direct bearing on what the law should reflect. In addition, these topics could prove to have practical application for the attorney attempting to establish the necessity for judicial acceptance of the seat belt defense. These areas include:

1. the human and economic toll arising from automobile accidents;
2. the events that take place during an automobile collision in terms of vehicle dynamics<sup>9</sup> and occupant kinematics;<sup>10</sup> and
3. the effects of a seat belt restraint system upon occupant kinematics.<sup>11</sup>

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(1972); Raphael, *Before the Crash: How Biomechanics Reduces Fatalities and Injuries*, 10 WARD'S AUTO WORLD 51 (1974); Comment, *Occupant Protection in Automobiles—Air Bags and Other Passive Restraints: The State of the Art, The Federal Standard and Beyond*, 27 AMER. U.L. REV. 635 (1978) [hereinafter cited as *Occupant Protection*]; U. Seiffert and G. Borenus, Development Problems with Inflatable Restraints in Small Passenger Vehicles, Society of Automotive Engineers (SAE) Paper No. 720409, May 22-25, 1972).

NHTSA has found that air bags are not as effective as lap-shoulder belts in the prevention of injuries from moderate, serious or fatal crashes. PROGRESS REPORT, *supra* this note, at 7. Collateral dangers created by use of air bags, especially inadvertent deployment risks, are described in *Pacific Legal Foundation v. Department of Transportation*, 593 F.2d 1338, 1346-47 (D.C. Cir. 1979). The dangers were found to be outweighed by the benefits.

<sup>8</sup> See AM. SAFETY BELT COUNCIL, KEY FACTS IN SUPPORT OF SAFETY BELT USE (1978); L. Patrick, *Passive and Active Restraint Systems: Performance and Benefit/Cost Comparison* Society of Automotive Engineers (SAE) Paper No. 750389 (1975) (estimated that by 1978 100% of the vehicle population would be equipped with lap belt shoulder harness systems). Interestingly, with the introduction of the 1965 model year, vehicles were equipped with front seat lap belts as standard equipment—years before this safety measure was required by Federal Motor Safety Standard 208, 49 C.F.R. § 571.208 (1979) (took effect January 1, 1968).

<sup>9</sup> Dynamics, in the laws of physics, refers to the production and causes of motion. R. RESNICK and D. HALLIDAY, *supra* note 5, at 79.

<sup>10</sup> Kinematics, in the laws of physics, refers to motion without regard to the force that produces it. *Id.* at 32.

<sup>11</sup> Although both dynamics and kinematics may be used to describe the motion of a vehicle and occupant involved in a collision, this article will discuss vehicles in terms of dynamics and occupant movement in terms of kinematics. This approach is roughly accurate in reconstructing an accident and locating the mechanism of occupant injury.

In view of judicial developments, it is imperative that such a multi-disciplinary approach to the seat belt defense be attempted. With a growing number of exceptions, courts have ruled that a defendant may not seek to lessen or avoid liability by showing that the plaintiff failed to use a restraint system. In this way the seat belt defense has frequently been rendered unavailable.<sup>12</sup> Too often, the judiciary has determined as a matter of law that a reasonable person need not use a life-saving mechanism, denying juries an opportunity to reach a different conclusion. Thus, paradoxically, while courts have expanded the scope of injury liability by asserting that damages could be enhanced if proved with specificity, defendants were advised that proof of the benefits which would have been provided through seat belt use was too speculative. The courts appeared oblivious to the public policies supporting the seat belt defense. Only in recent years has a discernible trend toward recognition of the seat belt defense begun to emerge. The following discussion is offered to increase the understanding necessary for a continuation of this judicial trend and to examine injury prevention through mandatory seat belt use legislation.

## II. THE HUMAN AND ECONOMIC TOLL

The magnitude of human loss attendant to automobile accidents may be better appreciated by comparing it to losses incurred in recent wars. Since the emergence of the automobile as a major means of private transportation, this nation has been engaged in three major military conflicts which have resulted in the deaths of approximately 430,000 Americans.<sup>13</sup> Yet, the total number of Americans killed during the Korean or Vietnam conflicts was only slightly higher than motor vehicle

<sup>12</sup> As a general rule, the seat belt defense is primarily used to mitigate damages or to show that a defendant's acts were not the proximate cause of injury. However, the failure to wear a seat belt can in itself be the proximate cause of an injury where it occasions a loss of vehicle control after a non-injury causing event. The seat belt defense should be available in either situation. See notes 143-54 *infra* and accompanying text.

<sup>13</sup> INFORMATION PLEASE ALMANAC (34th ed. 1980) [hereinafter cited as ALMANAC], indicates the following losses:

War	Period	Death Toll	Casualty Toll
World War II	1941-1945	318,274	565,861
Korea	1950-1953	54,246	103,284
Vietnam	1960-1972	57,002	303,704

*Id.* at 395.

The Road Safety Coordinating Council of British Columbia in a pamphlet circulated among editors of British Columbia newspapers noted that worldwide war deaths in the twentieth century totalled 23.5 million, but that deaths from motor vehicles during this some period totalled 25 million. British Columbia Road Safety Coordinating Council, Seat Belt Presentation (Feb. 9, 1977) (pamphlet on file with the author) [hereinafter cited as B.C. Presentation].

related deaths during *any single year* from 1970 through 1978.<sup>14</sup> In fact the loss of life from war pales in comparison to the death toll attributable to the automobile.<sup>15</sup>

The American public was reminded daily of events occurring in each of these wars. With this knowledge, the public overwhelmingly elected two Presidents largely because of a belief that they would terminate the death and destruction. If the American public were as aware of the enormity of the highway death toll, logic suggests that a similar public outcry would occur. The government and the media have never sought to bring the highway injury and death toll to the attention of the public on a daily basis. More significantly, when efforts have been made to advise the American public of how to reduce this staggering injury and death toll, they have been minimal, sporadic and incomplete.<sup>16</sup>

The annual toll in human life must be reduced. To do so requires public awareness of the loss and the means available to reduce it. In 1977, there were some 49,500 deaths and 1.9 million disabling injuries attributable to motor vehicle collisions.<sup>17</sup> In 1978, there were approximately 2 million disabling injuries as well as approximately 51,000 deaths attributable to motor vehicle accidents.<sup>18</sup> Of these disabling injuries it is safe to assume that a significant number resulted in some degree of permanent disability.<sup>19</sup> Despite the enormous problem

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<sup>14</sup> The ALMANAC, *supra* note 13 provides the following automobile fatality figures based upon National Safety Council data:

1970 - 54,633	1973 - 55,511	1976 - 47,038
1971 - 54,381	1974 - 46,402	1977 - 49,510
1972 - 56,278	1975 - 45,853	1978 - 51,500

*Id.* at 812.

Simple addition indicates more lives were lost in automobile accidents during the period 1970 - 1978 than in World War II, the Korean War and the Vietnam War combined. See notes 13 and 14 *supra*. Slightly different figures based upon the Fatal Accident Reporting System of the National Highway Traffic Safety Ad. have also been reported as follows: 1975 - 44,525; 1976 - 45,523; 1977 - 47,876; 1978 - 50,145. From 1975 to 1978 these figures show an increase in the fatality rate of 12.6% including a 4.7% increase from 1977 to 1978 alone. NATIONAL HIGHWAY TRAFFIC SAFETY AD., U.S. DEPT OF TRANSP., TRAFFIC SAFETY '78, 18 (1979).

<sup>15</sup> In considering the Highway Safety Act of 1966, the Senate Report stated: "The compelling need for the strong automobile safety legislation which the Commerce Committee is today reporting lies in these statistics: 1.6 million dead since the coming of the automobile; over 50,000 to die this year." S. REP. NO. 1301, 89th Cong., 2d Sess. 1-2 (1966).

<sup>16</sup> See notes 110-18 *infra* and accompanying text.

<sup>17</sup> NATIONAL SAFETY COUNCIL, ACCIDENT FACTS 3 (1978 ed.) [hereinafter cited as ACCIDENT FACTS, 1978]. 150,000 of the disabling injuries were permanent. These permanent disabling injuries ranged from stiff joints or finger amputations to complete paralysis.

<sup>18</sup> NATIONAL SAFETY COUNCIL, ACCIDENT FACTS 2 (preliminary condensed ed. 1979) [hereinafter cited as ACCIDENT FACTS, 1979].

<sup>19</sup> There were 380,000 permanent disabling injuries for all accidents reported

presented by these figures, the public remains more outraged by aircraft mass disasters than the everyday automobile accident.<sup>20</sup> The means to substantially reduce the human loss due to automobile collisions is currently available. If the general public can be persuaded or required to utilize seat belt restraint systems, the carnage will be greatly reduced.

The direct and indirect economic costs of these injuries and deaths is staggering. In 1977, the costs attributable to wage loss, medical expenses, insurance administration and property damage from motor vehicle accidents was 30.5 billion dollars.<sup>21</sup> In 1978, the National Safety Council reported that 34.2 billion dollars was attributable to motor vehicle accidents.<sup>22</sup> These statistics do not include the massive costs incurred by public agencies involved in automobile accident situations (such as police, fire, and ambulance services, and the judiciary), indirect losses to employers from off-the-job accidents, commercial cargo losses, or damages awarded through litigation in excess of direct loss.<sup>23</sup> Assuming that the economic loss for motor vehicle related injuries and deaths in 1979 will approximate those of 1977 and 1978, the total calculated loss for these three years is in the range of 90 to 100 billion dollars. A reasonable society would embrace the opportunity to reduce these costs.

Although the concept of attributing a cost value to injuries or to life is distressing and possibly abhorrent to some, it is a basic element of our tort compensation system. As pointed out by Transportation Secretary Coleman, methods have been developed by economists and actuaries to estimate the dollar value attributable to injury reduction.<sup>24</sup> One measuring device is to determine lost potential income and resultant medical costs together with legal expenses.<sup>25</sup> Utilizing recognized procedures and premised upon 1975 data, the Secretary estimated that if lap and shoulder seat belt restraint systems were used 70 percent of the time, 4.6 billion dollars would have been saved. It was also estimated that 100 percent utilization would have resulted in a benefit of 6.5 billion dollars.<sup>26</sup>

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by the National Safety Council for 1978. See ACCIDENT FACTS, 1979, *supra* note 17, at 1. This report also indicates that 49 percent of *all* accidents resulting in death were motor vehicle related.

<sup>20</sup> Yet the death toll for all aircraft accidents in 1977 and 1978 was approximately 3,000. ACCIDENTS FACTS, 1979, *supra* note 18, at 2.

<sup>21</sup> ACCIDENTS FACTS, 1978 *supra* note 16, at 4. The total loss attributable to motor vehicle accidents in 1977 was 32.5 billion. ALMANAC, *supra* note 13, at 391.

<sup>22</sup> ACCIDENT FACTS, 1979, *supra* note 18, at 4.

<sup>23</sup> *Id.*

<sup>24</sup> See DEPT OF TRANSP., SECRETARY'S DECISION CONCERNING MOTOR VEHICLE OCCUPANT CRASH PROTECTION (1976) [hereinafter cited as SECRETARY'S DECISION].

<sup>25</sup> *Id.* at 41 n.49.

<sup>26</sup> *Id.* at 40 (Table 1). Such benefits could be gained without incurring counter-



Another way to examine the economic impact of seat belt usage is to utilize a methodology first set forth by Yale Professor Guido Calabresi in the products liability area.<sup>27</sup> Common sense and the Calabresi economic approach suggest that accident costs may be alleviated by reducing the number and the severity of accidents, but automobile accidents are going to continue regardless of the improvements made in vehicle design and driver education. An important focus, therefore, is the reduction of injury severity. Recently, the result of such an economic analysis in regard to the need for seat belt use legislation was forcefully presented.<sup>28</sup> It was correctly asserted that the Calabresi goal of effective use of resources can be attained in three ways. First, it may be obtained through a general deterrence method which allocates the costs to the cheapest cost avoider, but allows the market to determine the desirability of particular activities and to make adjustments for incorrect allocations. Second, and in the alternative, a specific deterrence system may be used which allocates the costs to the best cost avoider and collectively decides whether an activity or act is desirable based on a benefit/cost analysis. Finally, the Calabresi goal may be reached through a mixed system, which combines portions of both general and specific deterrence.<sup>29</sup>

Conceivably, mandatory seat belt usage would allocate a proper portion of the loss to the consumer. Maximization of economic and health

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vailing expenses. *Id.* at 49 (Table 3).

The B.C. Presentations, *supra* note 13, indicates a similar view of the toll though on a smaller scale. The report estimated that if seat belt use in British Columbia were increased to 50% from the 20% level studied, some 168 lives would have been saved of the 788 fatalities predicted for 1976. The tangible costs saved would have been 11.5 million dollars; determined by valuing each life at 100,000 dollars and including direct hospital and medical costs, lost wages and spinal injury savings. Other savings such as the costs of fireman and police involvement were not included. The report asserted that an increase to 65% use would result in a 20% decrease in fatalities. The fatality rate reduction could be as high as 50% with greater use. *Id.*

In Sweden, an economic gain of 33 million United States dollars was reported for 1975 as a direct result of increased seat belt use. The data was reported by the Statens Trafiksakerhetsverk, cited in N. Bohlin, *Twenty Years of Safety Belt Experience and the Effect of Safety Belt Legislation in Sweden*, in '79 INTERNATIONAL SYMPOSIUM ON SEAT BELTS [hereinafter cited as SYMPOSIUM], 116, 120 (1979).

<sup>27</sup> See G. CALABRESI, *THE COSTS OF ACCIDENTS: A LEGAL AND ECONOMIC ANALYSIS* (1970). See also PERSPECTIVE ON TORT LAW (R. Rabin Ed. 1976); Hlemme, *The Enterprise Liability Theory of Torts*, 47 U. COLO. L. REV. 153 (1975); Sachs, *Negligence or Strict Product Liability: Is There Really a Difference in Law or Economics*, 8 GA. J. INT'L & COMP. L. 259 (1978); Note, *Reallocating the Risk of Loss in Automobile Accidents by Means of Mandatory Seat Belt Use Legislation*, 52 S. CAL. L. REV. 91, 121-39 (1978) [hereinafter cited as Note, *Reallocating the Risk of Loss*].

<sup>28</sup> Note, *Reallocating the Risk of Loss*, *supra* note 27, at 121-39.

<sup>29</sup> *Id.* at 131.

benefits to society could then be attained. The manufacturer is currently encouraged or required to develop safety devices and to be innovative in its approach to safety with the goal to reduce the severity of injury which occurs in unavoidable accident circumstances.<sup>30</sup> To promote such efforts and make the economic benefits practical instead of theoretical, a commensurate duty must be imposed on the best cost avoider, the consumer.<sup>31</sup> In light of the knowledge available to the consumer, and the relative ease of the burden imposed when balanced against the personal and economic consequences of the harm, no reasonable economic or legal argument can be raised to refute seat belt use legislation. Such legislation, or at least a more gradual and limited achievement of its objectives through judicial decisions, is the best alternative under Calabresian economic analysis.<sup>32</sup>

An evaluation of the costs of use and non-use of the automobile seat belt, the cost of accident prevention by drivers and the deterrent effect of liability rules establishes that failure to utilize an available seat belt is economically undesirable. Economic efficiency would be increased by changing the present liability rules:

Failure to avoid needless injuries is as wasteful as failure to avoid needless accidents. Injuries should be prevented when prevention is less expensive than the harm itself. In order to minimize total costs, liability for each increment of harm should be assigned to the party for whom prevention of the harm is cheapest. This approach to accident litigation would reduce waste of resources by recognizing that liability rules not only settle disputes within the courtroom but affect behavior outside it as well.<sup>33</sup>

It is important to recognize the distinction between injury preventive and accident-preventive precautions. In appropriate circumstances, the distinction is readily made and should be a factor in allocating liability. Courts and legislatures must realize that the costs of injury prevention are sometimes best borne by the injured party, who could have avoided the harm.

The cumulative effect of legislation such as safety regulations,<sup>34</sup> com-

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<sup>30</sup> *Id.* at 136-39.

<sup>31</sup> *Id.*

<sup>32</sup> *Id.* at 139. A less complex economic approach utilizing factors similar to those used in traditional negligence analysis (cost efficiency and transaction costs) also shows that the duty to wear a seat belt is economically appropriate. See Comment, *Self-Protective Safety Devices: An Economic Analysis*, 40 U. CHI. L. REV. 421 (1973).

<sup>33</sup> *Id.* at 441.

<sup>34</sup> *E.g.*, Nat'l Traffic & Motor Vehicle Safety Act of 1966, § 1, 15 U.S.C. §§ 1392, 1397, 1400-02 (1976); Consumer Product Safety Act, § 33, 15 U.S.C. §§

pensation systems,<sup>35</sup> tax incentives,<sup>36</sup> and judicial developments such as the abolition of the privity requirement<sup>37</sup> or the development of strict tort liability<sup>37</sup> may be to encourage trends which destroy the free enterprise system. One means to prevent this is to place entrepreneurial risks into a proper balance with consumer risks,<sup>39</sup> while promoting a maximization of accident and injury reduction.<sup>40</sup>

On the one hand, the producer frequently has available the best means of controlling the risk, both because knowledge of risk is a prerequisite to control and because he or she can introduce safer, albeit more costly, alternatives either by applying current technology or by investing in research. On the other hand, the user frequently can also control risk by avoiding foolish uses or by making use of some specific knowledge about significant alternatives that are in his or her control.<sup>41</sup>

In the automotive field, accidents cannot be prevented and the cost of producing an injury-free or injury-proof vehicle precludes the mass marketing of such a vehicle.<sup>42</sup> A more effective means to reduce injuries is to combine preventive design components, such as energy absorbing steering columns and padded dash boards, with wider use of presently

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2056-57 (1979); Federal Food, Drug, and Cosmetic Act of 1978, § 1, 21 U.S.C. §§ 301-92 (1978) and regulations issued thereunder.

<sup>35</sup> See e.g., Kenney and McCarthy, "No Fault" in Massachusetts, Chapter 670, Acts of 1970—A Synopsis and Analysis, 55 MASS. L. Q. 23 (1970).

<sup>36</sup> E.g., I.R.C. § 172(b)(1)(H) (carryback provisions in the Internal Revenue Code); I.R.C. § 537(b)(4) (product liability loss provisions).

<sup>37</sup> See MacPherson v. Buick Motor Co., 217 N.Y. 382, 111 N.E. 1050 (1916); Rogers v. Toni Home Permanent Co., 167 Ohio St. 244, 147 N.E.2d 612 (1958).

<sup>38</sup> E.g., Greenman v. Yuba Power Products, Inc., 59 Cal.2d 57, 27 Cal. Rptr. 697, 377 P.2d 897 (1963); Temple v. Wean United, Inc., 50 Ohio St.2d 317, 364 N.E.2d 267 (1977); RESTATEMENT (SECOND) OF TORTS § 402A (1965).

<sup>39</sup> Calabresi, *Products Liability: Curse or Bulwark of Free Enterprise*, 27 CLEV. ST. L. REV. 313 (1978).

<sup>40</sup> Seat belt restraint systems reduce injury severity in many accident circumstances and can be viewed as a means to avoid or reduce accident severity consistent with the Calabresi approach. In a smaller number of instances, retention of vehicle control is possible when a driver is belted. Such retention of control can avoid injury producing accidents entirely.

<sup>41</sup> Calabresi, *supra* note 39 at 320 n.51.

<sup>42</sup> Moreover, if each vehicle is to be built like an armored tank—in order to do the job of a tank—other functional advantages must necessarily suffer. A tank must, at the least, result in a purchase investment of scores of thousands of dollars. Equivalent protection in ordinary passenger cars may arguably prove less costly, but nevertheless at a pro rata price probably out of reach of the ordinary user. The cost of making a vehicle "crashproof" or "crashworthy" is inestimable.

Hoenig and Goetz, *A Rational Approach to "Crashworthy" Automobiles: The Need for Judicial Responsibility*, 6 SW. U.L. REV. 1, 65 (1974).

available seat belt restraint systems. The restraint system is simple, economical and functional. The dangers of injury resulting from the system itself are clearly outweighed by the injuries and losses it prevents.<sup>43</sup>

The automobile manufacturers have provided the consumer with a positive means to minimize accident-injury severity. It is human and economic waste for the consumer to ignore the use of a seat belt restraint system. Human suffering and economics dictate that the consumer be required to control the risk by applying his knowledge of the significant protection afforded by seat belt use.<sup>44</sup> Judicial decisions have yet to reflect a general seat belt usage standard; legislation should and perhaps will.

The human toll arising from automobile accidents is appalling and shows no sign of abating. A substantial portion of this toll can be avoided with minimal inconvenience and without additional cost to the consumer. The economic benefits to be derived from seat belt use include not only dollar savings, but also a reaffirmation of the free enterprise system. A proper legislative response would immediately reduce the number of motor vehicle related injuries and deaths, their resultant costs<sup>45</sup> and a tremendous amount of human suffering.

### III. THE PHYSICIST'S VIEW:

#### DYNAMICS AND KINEMATICS

Injury producing collisions occur in numerous ways due to combinations of factors such as driver error, environmental hazard, road design and vehicle malfunction. It is well known that the prevalent cause is driver error. Nevertheless, from both legal and physics perspectives, the cause of the accident has little bearing on the dynamics of the accident once the collision sequence commences.

Once a high-speed collision begins, the effects of dynamics and kinematics overcome any efforts of the vehicle occupants to control their movements. Occupant kinematics, the movements of the vehicle occupant during a collision sequence, have been extensively studied.<sup>46</sup>

<sup>43</sup> See note 26 *supra*, and notes 61-98 *infra* and accompanying text.

<sup>44</sup> Specific knowledge of the benefits resulting from seat belt use has been communicated through promotional and educational campaigns sponsored by public agencies and private organizations, driver education programs in many high schools, television programming and movie "shorts." See notes 108-18 *infra* and accompanying text.

<sup>45</sup> One commentator has estimated the economic gain of mandated seat belt usage to be 4.5 billion dollars. Note, *Reallocating the Risk of Loss*, *supra* note 27, at 92. This estimate appears to be conservative. See notes 21-25 *supra*, and notes 64-80 *infra* and accompanying text.

<sup>46</sup> See generally Campbell, *Seat Belt Effectiveness*, *Symposium supra* note 26, at 163; Hoenig and Goetz, *supra* note 42, at 44; L. Griffin, *Analysis of the Benefits Derived from Certain Presently Existing Motor Vehicle Safety Devices*:

Injuries during collision can arise from various factors, including impact with the interior of the vehicle, intrusion of an object into the passenger compartment, or impact with an object or the ground after ejection from the vehicle. During an accident-collision sequence, the deceleration of the vehicle is so rapid that it cannot be fully appreciated or analyzed in the absence of high-speed photography. The effect of this rapid deceleration upon an unrestrained object in the vehicle is virtually instantaneous<sup>47</sup> as the velocity of the object continues until stopped. Automobile contact and the completion of the injury-causing impact often occurs in a fraction of a second.<sup>48</sup>

The easiest way to determine the direction in which the occupant will move upon impact is to picture the occupant moving toward the point of impact. This simplification will provide the general initial direction of movement, but is not truly accurate. The occupant's movement, in actuality, remains basically unchanged from the direction in which the vehicle was moving. The appearance is that of the occupant moving toward the impact point, but in a more precise sense, the most significant change of direction is that of the vehicle.<sup>49</sup>

During a frontal collision the unrestrained driver moves forward and most likely makes an initial contact with his knees against the lower instrument panel. His movement continues in a forward direction forcing the chest into the steering wheel or steering column system. At this time, most of the torso is decelerating but the head remains unimpeded and continues on to strike the windshield, the top of the instrument panel or the steering wheel rim. What the head will strike is a function of several factors, one of which is simply the height of the occupant. A passenger moves in much the same fashion as the driver except that the chest strikes the dash as the head continues forward into the windshield

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A Review of the Literature, (Highway Safety Research Center, Univ. of North Carolina, December 1973); A. Siegel, W. Van Wagoner and A. Nahum, Case Comparisons of Restrained and Unrestrained Occupants and Related Injury Patterns, (Society of Automobile Engineers (SAE) Paper No. 690245, 1967) [hereinafter cited as Case Comparisons].

<sup>47</sup> See note 5 *supra*. Vivid illustrations of the vehicle and human collisions are set forth in TRANSPORT CANADA, ROAD SAFETY, THE HUMAN COLLISION 1-3 (2d ed., 1976) [hereinafter cited as THE HUMAN COLLISION].

<sup>48</sup> For example, in a 30-35 miles per hour head-on collision, the unrestrained occupant will travel at approximately 45 feet per second after impact and will strike the dash or windshield within approximately .055 seconds. Occupant movement will then decelerate drastically and his velocity relative to both the vehicle and the road (as the vehicle will have come to almost a complete stop) will be virtually zero in approximately .09 seconds. B.C. Presentation, *supra* note 13, at 4.

<sup>49</sup> In essence, the vehicle interior is being moved toward the driver as the vehicle accommodates the forces imposed upon it. The vehicle is reacting in accordance with the concepts of Newton's Third Law of Motion: for every action or force there is an equal and opposite reaction. See R. RESNICK and D. HALLIDAY, *supra* note 5, at 87.

or windshield frame. As the speed of the automobile at the time of the impact increases, the velocity at which each occupant collides with the vehicle interior also increases, thus the more serious the ensuing harm. If the vehicle strikes an immovable barrier at approximately thirty-three miles per hour, the mean average level forces necessary to produce a fatal injury are reached.<sup>50</sup>

In a right-frontal impact, the occupant moves toward the right front corner of the vehicle. A passenger moves toward the right side "A" pillar—the point between the side glass and the windshield. Although padded, this is an extremely dangerous point as the head can absorb the benefits of the padding and still have enough force to cause permanent brain damage or death. Similarly, in a left-frontal impact, the driver does not move directly forward, but appears to move toward the point of impact. The driver moves forward and laterally toward the left, either brushing or by-passing the steering wheel. The shoulder or head impacts at the front of the driver's door, the door header or near the "A" pillar. In each of these situations serious injuries could be received at speeds well below twenty-five miles per hour and even as low as ten to fifteen miles per hour.<sup>51</sup>

Even where there is adequate time to react before a collision, the vehicle occupant cannot physically alter these kinematics. There is no place to hide. The forces generated are far too severe and can reach an order of magnitude above twenty-five G's<sup>52</sup> during an intersection collision with both vehicles travelling at speeds no greater than twenty-five to thirty miles per hour. Thus a person weighing 150 pounds will generate a force of 3,750 pounds, which must be dissipated in less than one second. Even at far lesser speeds, the human being is incapable of withstanding the forces which occur from such a sudden deceleration.<sup>53</sup>

The danger that an unrestrained occupant poses to other occupants in the vehicle is that he/she can directly or indirectly strike another per-

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<sup>50</sup> Caster, *Passive Protection at 50 Miles per Hour*, 1-2 (Society of Automobile Engineers (SAE) Paper No. 720445, 1972). The Department of Transportation (DOT) reports that non-belted fatalities have been recorded at speeds as low as 12 miles per hour. NATIONAL HIGHWAY TRAFFIC SAFETY AD., DEPT OF TRANSP., HOW MANY OF THESE FAIRY TALES HAVE YOU TOLD? (1975). In *Dreisonstok v. Volkswagenwerk A.G.*, 489 F.2d 1066 (4th Cir. 1974), the court found that "[t]here was testimony—which was not seriously questioned—that experiments conducted under the auspices of the Department of Transportation indicated that 'the average barrier equivalent velocity for fatalities, the mean velocity is only 33 miles per hour. . . .'" *Id.* at 1076 (footnote omitted).

<sup>51</sup> See NATIONAL HIGHWAY TRAFFIC SAFETY AD., DEPT OF TRANSP., HOW MANY OF THESE FAIRY TALES HAVE YOU TOLD? (1975).

<sup>52</sup> One "G" is the acceleration due to gravity, or 32 feet per second per second. It is a measurement which indicates the force to which a body is subjected when accelerated or decelerated. See R. RESNICK and D. HALLIDAY, *supra* note 5, at 48.

<sup>53</sup> THE HUMAN COLLISION, *supra* note 47, at 4.

son. This impact can result in direct injury due to body contact or indirect injury from forcing the second person to strike a portion of the vehicle interior. One of the most dismaying effects of the occupant's loss of body control occurs when a person holding a small child is thrown forcibly against the child so that the child is crushed to death.<sup>54</sup> These unrestrained occupant injuries can be serious or fatal. Nevertheless no significant attention was given to them until 1974.<sup>55</sup>

Although physically unable to prevent injury at the time of collision, precautions can be taken before the accident. The simple expediency of buckling an already available seat belt will drastically modify occupant kinematics. The seat belt, unlike the human being, can normally withstand the forces generated in a collision.<sup>56</sup> Although a person can partially slide under (submarine) a lap belt that is too loosely buckled, this sliding represents a significant decrease of lower torso kinematics. Since the lap belt is anchored solely over the pelvic region, the upper torso can still move forward (jack-knifing) and thus permit some injury potential. A properly functioning lap belt will prevent all cases of full body ejection and will limit the extent of partial body ejection. Since the hips are fixed, thereby fixing the body's center of gravity, no forward motion of the full body will occur and the upper torso can extend no further than the torso's length permits. The number of body parts making contact with either the vehicle interior or an intruding object is thereby limited. Moreover, since the full body weight as increased by the G forces is not involved, the severity of the impact may also be reduced.

When the modern-day, three-point system consisting of a lap belt and shoulder harness is in use, the effects upon kinematics are more pronounced. No significant body movement of the lower or upper torso is possible and lateral movement is greatly reduced. Although a small potential for partial lateral ejection remains, it is of limited significance. In order for a serious injury to occur, there must be severe motion of the head and neck, significant passenger compartment intrusion, or a

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<sup>54</sup> *Id.* at 5.

<sup>55</sup> Hulke, Sherman & O'Day, *The Hazard of the Unrestrained Occupant*, 16 J. TRAUMA 383 (1978) (first presented at the 18th Conference of the American Association for Automotive Medicine in 1974). *See also*, THE HUMAN COLLISION, *supra* note 47, at 5. One form of "indirect" striking takes place when a rear seat passenger hits the front seat forcing it into the front seat occupant.

<sup>56</sup> 49 C.F.R. § 571.209 (1977), establishes requirements for seat belt assemblies. One commentator has analyzed malfunction rates of lap and shoulder belts as well as lap belts alone. *See* R. HALL, FACT BOOK: A SUMMARY OF INFORMATION ABOUT TOWAWAY ACCIDENTS INVOLVING 1973-1975 MODEL CARS (Highway Safety Research Center, Univ. of North Carolina, 1976). Malfunction is a recognized problem, but appears to be one of minimal importance. Although some vehicles displayed a relatively high propensity for seat belt malfunction, the overall failure rate for all vehicles studied ranged from 0.6 percent to under 4 percent. *See id.*, tables 225 and 226. Even these figures appear to be higher than normal.

force sufficient to negate the benefits of body restraint.<sup>57</sup> The likelihood of severe head or neck movement is substantially reduced by the passive protection offered by head restraints.<sup>58</sup> Injury producing passenger compartment intrusion requires severe accident circumstances and it is unlikely that any device now technologically feasible could preclude injuries from this source. Similarly, if the forces are so great as to cause serious injury despite occupant restraint, it is highly unlikely that any available safety device could have prevented injury.

Driver kinematics upon impact, altered by use of a seat belt, have been described as follows:

[T]he car strikes and begins rapidly to stop. Since the driver is fastened to the car by the seat belt, he slams against the belt and immediately begins to slow down too. During that crucial split second instead of sliding freely across the seat, he is being held in place and begins to slow down *with the car*. This means that the stopping force acting on the driver is spread out over a longer time and a longer distance, and he more nearly approximates the deceleration pattern of the car, as contrasted to the shorter and more severe deceleration time suffered by the unbelted driver. A longer deceleration time means that lower "G" forces are acting on his body.<sup>59</sup>

Despite the effects of a seat belt restraint system, injuries will occur

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<sup>57</sup> A noted authority specified three methods by which a seat belted occupant could be injured, (1) loads above the injury threshold, (2) excessive movement of the belt and (3) passenger compartment intrusion. Intrusion is noted as the most pervasive. Trinca, *Medical Aspects of Seat Belt Usage*, SYMPOSIUM, *supra* note 26 at 151, 152.

Ejection of vehicle occupants has also been noted as a primary injury source since the first studies of automobile safety were made. Such ejections were significantly reduced through redesign of vehicle door and door latch systems consistent with technological capacity and recommendations of the Society of Automotive Engineers. Nevertheless, ejection through inadvertent door openings or through window areas remain a significant injury hazard to the unrestrained vehicle occupant. *See generally*, R. HALL, FACT BOOK, A SUMMARY OF INFORMATION ABOUT TOWAWAY ACCIDENTS INVOLVING 1973-1975 MODEL CARS; A. Gross, Accident Motorist Ejection and Door Latching Systems (Society of Automotive Engineers (SAE) Paper No. 817A (1964)); D. Huelke and H. Sherman, Automobile Occupant Ejection Through The Side Door Glass (Automotive Engineering Congress, Detroit, Mich. Society of Automotive Engineers (SAE) Paper No. 710076 (Jan. 1971)); J. Moore and B. Tourin, A Study of Automobile Doors Opening Under Crash Conditions, Automobile Crash Injury Research (1954).

At least one study strongly suggests that emphasis upon ejection related spinal cord injury may be too great. Burke, *Spinal Cord Injuries and Seat Belts*, 2 MED. J. AUSTRALIA 801 (1973).

<sup>58</sup> Head restraints have been required since 1969. 49 C.F.R. § 571.202 (1980).

<sup>59</sup> *Seat Belt Effectiveness*, *supra* note 46, at 164 (emphasis in original).



during automobile collisions. Seat belt restraint systems modify occupant kinematics, but they cannot perform the impossible. Potential and actual injury reduction through the use of such systems is substantial and has been reported in numerous studies in the United States and elsewhere,<sup>60</sup> but it is also true that seat belt restraint systems can induce injuries in some circumstances.<sup>61</sup> Therefore for a full evaluation of the benefits of a mandatory seat belt use law, it is necessary to determine what the injury reducing potential is and to determine whether seat belt induced injuries are comparable in either quantity or quality to injuries sustained by unrestrained occupants. As will be shown, the number of injuries and fatalities avoided is high, whereas the number of seat belt induced injuries, especially of a severe nature, is extremely low.

#### IV. MEDICAL ASPECTS OF SEAT BELT USE

##### A. *Injury Reduction*

Seat belt restraint systems are the single best method available to significantly reduce the number of serious and fatal injuries caused by motor vehicle accidents. These beneficial effects have been known for over a generation. Twenty-two years ago, it was noted that "[t]he use of properly designed and installed seat belts . . . not only protects the wearer from the risks associated with ejection, but also reduces the force with which he is likely to strike objects within the passenger compartment."<sup>62</sup>

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<sup>60</sup> See notes 26 *supra* and 62-84 *infra* and accompanying text.

<sup>61</sup> See notes 85-98 *infra* and accompanying text.

<sup>62</sup> Tourin, *Ejection and Automobile Fatalities*, 73 PUBLIC HEALTH REPTS. 381, 389 (1958). See also J. Moore and B. Tourin, *A Study of Automobile Doors Opening Under Crash Conditions*, in AUTOMOBILE CRASH INJURY RESEARCH (1954). Tourin conservatively estimated that prevention of ejection alone would save approximately 5,500 lives annually. Five years later a similar estimate, that 5,000 lives would be saved annually by preventing ejection, was made. B.J. Campbell and J.K. Kihlberg, *Seat Belt Effectiveness in the Non-Ejection Situation*, 7th STAPP CAR CRASH CONF. 177 (1963).

The benefits of seat belt use have been summarized by the Chairman of the Road Trauma Committee, Royal Australian College of Surgeons, as:

Seat belt restraint remains the single most effective measure in protecting vehicle occupants against death and serious injury in road crashes.

It is estimated that serious and fatal injuries are reduced by 65-80% and moderate injuries by 40-60% by the wearing of seat belts. . . .

If the present 14% wearing rate by motorists in the U.S.A. was increased to 70%, some 7,500 lives would be saved each year. . . .

A restrained occupant has a ten times less chance of being ejected in a road crash than an unrestrained occupant.

Total restraint removes the threat of strapped occupants being subjected to excessive loading from unrestrained occupants.

Seat belt efficiency is best determined by its correlation to specific injuries and injury levels. Injury levels are generally measured by the Abbreviated Injury Scale, an internationally recognized categorization-of-injury system that scales injuries according to severity.<sup>63</sup> Estimates of the number of lives that have been saved and can be saved in the future by use of the seat belt vary, but these estimates consistently suggest significant life saving potential.<sup>64</sup> In 1971, it was estimated that seat belts saved between 2,800 and 3,500 lives in the United States and

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Intrusion of the occupant space is the most important single factor in determining the risk of injury in a given crash. . . .

The benefits of seat belts should not be considered in isolation but in conjunction with a car's structure, its geometry and interior impact attenuating systems. . . .

The fitting of seat belts is highly cost effective because of the value of injuries prevented and all fatalities saved are a bonus. . . .

Trinca, *Medical Aspects of Seat Belt Usage*, in SYMPOSIUM, *supra* note 26 at 151. [citations omitted].

<sup>63</sup> The Abbreviated Injury Scale (AIS) rates injuries on the following scale without regard to cumulative effect:

- 0 - no injury;
- 1 - minor injury;
- 2 - moderate injury, not dangerous;
- 3 - severe injury, not life-threatening;
- 4 - serious injury, life-threatening, survival probable;
- 5 - critical injury, survival uncertain; and,
- 6 - maximum injury, currently untreatable (fatal).

The Overall Accident Injury Scale (OAIS) describes the cumulative effect of injuries sustained. The scale is similar to the AIS. Throughout this article, AIS data will be utilized.

<sup>64</sup> See N. Bohlin, *A Statistical Analysis of 28,000 Accident Cases With Emphasis on Occupant Restraint Value*, 11TH STAPP CAR CRASH CONFERENCE 229 (1967), abstract reprinted in 12 TRAFFIC SAFETY RESEARCH REVIEW 29 (1968). Mr. Bohlin found that use of Volvo's three-point harness reduced injuries between 40 percent and 90 percent depending on the accident, speed and type of injury. He also noted that non-belted occupants suffered fatal injuries from collisions at all speeds but that none of the belted occupants were fatally injured from collision speeds below 60 mph. See also, Levine and Campbell, *The Energy Absorbing Steering System in the Reduction of Injuries*, 4 J. SAFETY RESEARCH 106 (1972); J. Kihlberg, *Efficacy of Seat Belts In Injury and Noninjury Crashes in Rural Utah*; Technical Report, (Cornell Aeronautical Laboratory, Inc., May, 1969); D. Levine and B. Campbell, *Effectiveness of Lap Seat Belts and the Energy Absorbing Steering System in the Reduction of Injuries* (Safety Research Center, Univ. of North Carolina, Nov. 1971); *A Study of Seat Restraint Use and Effectiveness in Traffic Accidents* (Highway Safety Foundation, Jan. 1970); B. Tourin & J. Garrett, *Safety Belt Effectiveness in Rural California Automobile Accidents* (Cornell Aeronautical Laboratory, Inc., Feb. 1970). Levine and Campbell found that seat belt use would reduce serious injury by 43 percent. Another commentator estimated that lap belts reduce death and serious injury to drivers by 40-50 percent and increase the probability that a vehicle occupant will sustain no injury. L. Griffin, *supra* note 46, at 3-4.

would have prevented 8,000 to 10,000 fatalities had all the involved vehicle occupants worn the available seat belt system.<sup>65</sup> However, an anticipated 100% seat belt usage is unrealistic, and a better evaluation was reached by former Transportation Secretary Coleman who concluded: "If seat belt use were increased to 70% or if all cars were equipped with passive restraints, approximately 10,000 lives would be saved annually."<sup>66</sup> Additionally, he determined, based upon data for the 1975 car population and fatality rates, that such utilization would prevent 11,500 fatalities and 162,000 injuries of the AIS two through five levels annually.<sup>67</sup>

A noticeable decline in automobile fatalities was observed in Victoria, Australia after it adopted mandatory seat belt use legislation. According to one report, during 1971 driver and passenger fatalities in Victoria dropped 15% and 19% respectively, compared with an increase of 2% for drivers and no change for passengers in the remainder of Australia.<sup>68</sup> The report also indicated that a reduction of 2,500 fatalities from the number anticipated for an eight year period ending in 1978, a 32% decrease, was primarily attributable to seat belt use.<sup>69</sup> Such seat belt use also accounted for a 42% reduction in serious injuries.<sup>70</sup> These results were achieved even though the number of vehicle miles travelled during the years had increased.<sup>71</sup> A 1975 hospital survey in Victoria dramatically reinforced these findings.<sup>72</sup> The survey revealed that over a five-year period of sustained high seat belt use, significant reduction of specific injuries was found.<sup>73</sup>

<sup>65</sup> NATIONAL SAFETY COUNCIL, *TRAFFIC ACCIDENT FACTS* (1972 ed.). See also *ACCIDENT FACTS*, 1978, *supra* note 17, at 53.

<sup>66</sup> SECRETARY'S DECISION, *supra* note 24, at 29.

<sup>67</sup> *Id.* at 40. See note 63 *supra*.

<sup>68</sup> Joubert, *Development and Effects of Seat Belt Laws in Australia*, SYMPOSIUM, *supra* note 26, at 126.

<sup>69</sup> *Id.* at 129.

<sup>70</sup> *Id.*

<sup>71</sup> *Id.* at 130.

<sup>72</sup> Trinca, *supra* note 57, at 152.

<sup>73</sup> *Id.* This report can be summarized as follows:

<u>Fatal Injury Site</u>	<u>Percent of Reduction (frontal collision)</u>	<u>Percent of Reduction (rollover collision)</u>
Head	82	80
Chest	53	67
Abdominal	30 +	48
<u>Serious Injury Site</u>	<u>Percent of Reduction</u>	
Eye	87	
Facial and Chest	50	
Knee Cap and Hip	40	
Spinal Cord	27	

This report also puts to rest the myth that seat belts are particularly

Beneficial results from seat belt usage are contingent upon two factors: "[T]he usage of restraint and the injury reducing effects of the restraint when used."<sup>74</sup> Utilizing reports from Australia, the United Kingdom, Sweden and the United States, a Swedish expert, Bohlin, concluded that the three-point seat belt restraint system has a high and documented injury mitigating effect.<sup>75</sup> A viewing of the most recent analysis of the Volvo seat belt restraint system verifies this conclusion.<sup>76</sup> As with other studies, reduction of minor injuries was moderate (24%), but more significant was the substantial reduction in severe injuries (68% on the average and 74% for front seat passengers).<sup>77</sup> Sweden's compulsory use law was found to be of great value and directly responsible for a 45% reduction in severe injuries for drivers and 67% for passengers.<sup>78</sup> Severe or fatal head and chest injuries were similarly reduced by 63% and 52% respectively.<sup>79</sup>

Another research group analyzed eighty crashes in which the authors conducted on-the-scene accident investigations.<sup>80</sup> The crashes resulted in 101 front seat occupant fatalities and of these, only four victims had their seat belts fastened, two were wearing only lap belts.<sup>81</sup> Comparisons and conclusions were made as to each type of restraint system currently available (lap belts, lap-shoulder belts, air bag alone, air bag

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dangerous to pregnant women. In severe crashes the maternal death rate for unrestrained mothers is double that of belted mothers and fetal loss has a four times greater chance of occurring if the mother is ejected. *Id.* at 153. Despite the possibility of belt-caused injuries to pregnant women and the fetus, the overall chance of survival and avoidance of serious injury is much greater if the belt is worn. *Id.* See also P. Costiloe and W. Crosby, *The Effect of Lap Belt Restraint on Pregnant Victims of Automobile Collisions*, in PROCEEDINGS, 14TH ANNUAL CONFERENCE AMERICAN ASSOCIATION AUTOMOTIVE MEDICINE 97 (1970). An earlier report premised upon a single incident suggested that a design modification of seat belts should be made for pregnant women. Rubovits, *Traumatic Rupture of the Pregnant Uterus From "Seat Belt" Injury*, 90 AM. J. OBS. AND GYN. 828 (1964). The primary reason for such injuries appears to be that the belt is worn high, over the abdomen, instead of properly worn below the "bulge."

<sup>74</sup> N. Bohlin, *supra* note 26, at 118.

<sup>75</sup> *Id.*

<sup>76</sup> N. Bohlin, *Fifteen years with the Three-point Safety Belt*, in PROCEEDINGS OF THE SIXTH INTERNATIONAL CONFERENCE OF THE INTERNATIONAL CONFERENCE OF THE INTERNATIONAL ASSOCIATION FOR ACCIDENT AND TRAFFIC MEDICINE (1977).

<sup>77</sup> N. Bohlin, *supra* note 26, at 120.

<sup>78</sup> *Id.* at 121.

<sup>79</sup> *Id.* These injury and fatality reductions were at least partially the result of the compulsory use law in this comparison of 3,000 pre-law and 2,000 post-law cases.

<sup>80</sup> D. Huelke, *Effectiveness of Current and Future Restraint Systems in Fatal and Serious Automobile Crashes*, (Society of Automotive Engineers (SAE) Paper No. 790,323, 1979) [hereinafter cited as *Current and Future Restraint Systems*].

<sup>81</sup> *Id.* at 1. In addition, the authors analyzed 70 instances in which serious injury (AIS 3 or above, see *supra* note 63) occurred to front seat occupants.

plus lap belt and passive belt system), but only lap-shoulder belts, the prevalent system used in the United States, will be discussed. It was determined from specific accident circumstances that between 42 and 57 percent of the fatalities would have occurred regardless of the restraint system, thus the study concluded that 32 percent of the fatalities would have been avoided had lap-shoulder belt systems been in use.<sup>82</sup>

This study establishes that lap-shoulder belts may prevent approximately one-third of the fatalities that would otherwise occur to front seat occupants in severe accident circumstances. Noting that Secretary Coleman's decision indicated a total of 27,200 front seat occupant fatalities for its study period,<sup>83</sup> the above conclusion indicates that at least 7,344 and perhaps as many as 13,872 lives could have been saved had restraint systems been used.<sup>84</sup>

<sup>82</sup> *Id.* at 3. This proportion was significantly less than that suggested by other studies. See, e.g., Rininger and Boak, *Lap-Shoulder Belt Effectiveness*, PROCEEDINGS, 20TH ANN. CONF. OF AM. A. AUTOMOTIVE MED. (1976) (77%); R. Hall, *supra* note 56 (55%). Even prior studies by Huelke indicated a higher percentage. See D. Huelke, T. Lawson, R. Scott, J. Marsh IV, *The Effectiveness of Belt Systems in Frontal and Rollover Crashes*, (Society of Automotive Engineers (SAE) Paper No. 770148, Feb. 28—March 4, 1977) (57-91%) [hereinafter cited as *Frontal and Rollover Crashes*].

<sup>83</sup> SECRETARY'S DECISION, *supra* note 24.

<sup>84</sup> As indicated (see, note 82 *supra*) some studies showed higher injury reduction percentages. See also PROGRESS REPORT, *supra* note 6. This study provided injury and fatality reduction data based upon the Restraint System Effectiveness Program (RSEP) and National Crash Severity Study (NCSS) data. Lap belt-shoulder harness systems reduced the rates by the following percentages:

	<u>RSEP</u>	<u>NCSS</u>
Fatal	55	48
AIS 4-5	55	61
AIS 3	57	61
AIS 2	57	61

*Id.* at 17.

A 1976 study, D. Huelke, T. Lawson, *Lower Torso Injuries and Automobile Seat Belts*, (Society of Automobile Engineers (SAE) Paper No. 760370, Feb. 23-27 (1976), confined its examination to lumbar spine, abdominal and pelvic injuries. It addressed the categories of injury most often attributed to lap belt use as distinct from lap shoulder-belt use. The study found that there was an increase of 50% in the "no injury" category for lap belt users over non-users. At the serious injury level of AIS 3-5, (note 60 *supra*) there was a significant overall reduction of injuries. At this more serious injury level, pelvic injuries were sustained by 28% of the unrestrained occupants but only 9% of the lap belted; abdominal injuries by 27% of the unrestrained, 13% of the lap belted. Only in the case of lumbar spine injuries did the lap belted occupants receive more frequent injuries than their unrestrained counterparts. *Id.* at 3. This increase would probably be eliminated with use of a three point restraint system. See also *Frontal and Rollover Crashes*, note 82 *supra*.

The fatality reduction would not be at the expense of having survivors sustain serious injuries. D. Huelke, *Death and Injuries Prevented by Lap Shoulder Belt Usage in the United States*, in SYMPOSIUM *supra* note 26 at 160.

### B. *Injury Caused by Seat Belt Use*

Often it is argued that seat belts create as many dangers as they eliminate. One of the primary dangers allegedly related to seat belt use is the claim that vehicle occupants will be trapped in the vehicle and subjected to an increased danger from either drowning or fire. One study evaluating the assertion found that "[f]ears that the occupant is more likely to be trapped if the belt is worn are not borne out by the data."<sup>85</sup> The study recognized the existence of seat belt induced injury and placed this type of injury into proper perspective:

One of the main detriments to seat belts as an injury preventing countermeasure is that seat belts themselves cause injuries. However, one can see that with the exception of the "probable" category, the belt caused injuries are much less costly (and hence less severe) than the non-belted caused injuries. . . . Belt caused injuries are primarily contusions and pains in the hip, abdomen and chest.<sup>86</sup>

A similar recognition of seat belt induced injuries viewed within proper parameters was made in a Swedish report.<sup>87</sup> Although the three point restraint system reduced AIS two to six level injuries by fifty percent, an increase in AIS one to two level chest injuries of twenty-seven percent was reported.<sup>88</sup> This finding was consistent with prior experience which suggested that seat belt use can be associated with minor to moderate chest injuries.<sup>89</sup> As to specific areas of injury the report indicated that:

Minor to moderate chest injuries (rib fractures) are the "typical" belt induced injury. . . . Severe abdominal injuries as reported by various researchers is very unique. . . . Lap strap related injuries are of a minor degree when they appear.

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<sup>85</sup> R. Hall, *supra* note 56, at 241. An earlier study found that only one-half of one percent of all injury producing accidents were followed by fire or submersion. Gagen, *Seat Belts: No Longer Why, But Why Not?*, *Today's Health*, July 1960, at 26, cited in *Bentzler v. Braun*, 34 Wis.2d 362, 392 n.12, 149 N.W.2d 626, 643 n.12 (1967). A study of belted drivers who were killed in motor vehicle accidents in Ontario, Canada from 1972-75 disclosed a total of 175 fatalities of which only three died in a burning or submerged vehicle (.017%). In two of the years studied no belted driver died as a result of fire or water. The report stressed the importance of a seat belt in keeping the vehicle occupant conscious. *THE HUMAN COLLISION*, *supra* note 46, at 15. Another report indicates that approximately 1,500 lives are lost annually in the United States due to post-accident fires. This suggests a slightly higher incidence of post-accident fires. 4 *PROD. SAFETY NEWS* 1 (No. 3, March, 1976).

<sup>86</sup> R. Hall, *supra* note 56, at 214.

<sup>87</sup> N. Bohlin, *supra* note 25.

<sup>88</sup> *Id.* at 121 (Table 9). See note 63 *supra*.

<sup>89</sup> *Id.* at 121.

The occurrence of severe abdominal injuries is certainly related to a poor belt design with the buckle positioned high up. . . . Clavicle fractures are rare in frontal impacts, but appear sometimes in side impacts.

Injuries to head and face are not a major problem. . . .<sup>90</sup>

The experience in Australia similarly suggests that there is little evidence that properly worn belts cause serious injury.<sup>91</sup> From a medical perspective, seat belt-induced injuries are less severe than those that would have been sustained without them. Belt-produced injury is rare and generally confined to abrasions and bruising of the chest and abdomen, with exceedingly rare head and neck injuries in the absence of head contact. Serious abdominal injuries have been noted in the elderly and improperly worn belts increase the likelihood of serious abdominal injury (ruptured viscera) and injury to the carotid artery.<sup>92</sup>

Reports of fatal neck injury due to seat belts were presented in an early study based on the Swedish experience with diagonal belts.<sup>93</sup> In each of the three fatal cases reported, the victim probably had his lower jaw caught in the belt when the person was ejected.<sup>94</sup> It appears that such slipping could not have occurred had a lap belt been worn in addition to the diagonal belt.<sup>95</sup>

Most of the reported belt induced injuries involve the abdominal or pelvic areas with injuries such as ruptures of the pancreas or spleen and pelvic fractures.<sup>96</sup> Conspicuously absent from clinical data presented has

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<sup>90</sup> *Id.* at 123 (emphasis omitted).

<sup>91</sup> Trinca, *supra* note 57.

<sup>92</sup> *Id.* at 152.

<sup>93</sup> Saldeen, *Fatal Neck Injuries Caused by Use of Diagonal Safety Belts*, 7, J. TRAUMA 856 (1967). Similarly, many of the adverse reports found in the United States are of questionable validity in that the cases studied involved early seat belt systems. See, e.g., Fletcher and Brogden, *Seat Belt Fractures of the Spine and Sternum*, 200 J. AM. MED. A. 167 (1967); Howland, Curry and Buffington, *Fulcrum Fractures of Lumbar Spine*, 193 J. AM. MED. A. 240 (1965).

<sup>94</sup> Saldeen, *supra* note 93, at 862.

<sup>95</sup> In Europe, unlike the United States, early restraint systems often utilized only a diagonal belt without a supplementary lap belt. The likelihood of such injuries occurring with modern restraint systems is virtually non-existent. See generally, L. Patrick, COMPARISON OF THREE POINT HARNESS AND LABORATORY DATA, FINAL REPORT (1974). In fact, modern passive belt systems are designed to preclude such slipping. See PROGRESS REPORT, *supra* note 6, at 7.

<sup>96</sup> See Fish and Wright, *The Seat Belt Syndrome - Does it Exist?* 5 J. TRAUMA 746 (1965) (concluding that the injuries due to seat belt use are less important than the death and injury prevented); Sube, *Seat Belt Trauma to the Abdomen*, 113 AM. J. SURGERY 364 (1967) (attributing such injuries to improperly worn belts); and Tolins, *An Unusual Injury Due to the Seat Belt*, 4 J. TRAUMA 397 (1964) (premised upon a case history of "seat belt syndrome"). Other commentators have indicated a lower percentage of serious lower body injuries to belt users than non-users and found that the number of injuries traceable to the belt

been evidence of belt induced fatalities even though there are recognized unsubstantiated claims of such occurrences. In any event, many of these belt induced injuries will be avoided as modern three-point systems replace earlier model seat belt restraints.<sup>97</sup>

Among the nation's leading experts it is evident that the risk of serious seat belt induced injuries is perceived as minimal. In this regard, one such expert concluded:

... I acknowledge that we have all heard of isolated instances in which belts are supposed to have made the situation worse. We have heard speculations as to various unusual crash circumstances where the belt is said to be ineffective. Such cases are difficult to trace and tend to vanish like smoke when one tries to locate them.<sup>98</sup>

## V. MANDATORY SEAT BELT USE LEGISLATION

### A. *The Debate*

The primary arguments against mandatory seat belt use legislation are not related to the effectiveness of seat belts as a means to reduce injury and death, the technical aspects of the system, or even to asserted constitutional inhibitions.<sup>99</sup> Instead they revolve about asserted public resistance and the political ramifications of such resistance.<sup>100</sup>

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itself was small. Garrett and Braunstein, *The Seat Belt Syndrome*, 2 J. TRAUMA 220 (1960). See also, *McCord v. Green*, 362 A.2d 720, 723 (D.C. App. 1976).

<sup>97</sup> See, e.g., W. Reidelbach, *Recent and Future Improvements in Seat Belt Design*, in PROCEEDINGS OF THE 6TH INTERNATIONAL CONFERENCE OF THE INTERNATIONAL ASSOCIATION FOR ACCIDENT AND TRAFFIC MEDICINE (1977); G.J. Sheahan, *Recent Improvement in Seat Belt Design*, in PROCEEDINGS OF THE 6TH INTERNATIONAL CONFERENCE OF THE INTERNATIONAL ASSOCIATION FOR ACCIDENT AND TRAFFIC MEDICINE 232 (1977).

<sup>98</sup> Campbell, *supra* note 46, at 166.

<sup>99</sup> See notes 119-33 *infra* and accompanying text.

<sup>100</sup> Successful implementation of mandatory use legislation was rejected as an alternative by Secretary Coleman for precisely such reasons:

I have rejected this alternative [mandatory usage] because I believe that a Federal requirement of such laws is politically [in]feasible [sic]. Both the public record and our past experiences with Federal efforts to encourage the enactment of belt use laws indicate that a highway safety standard mandating that each state take action to increase belt use could not be sustained. Recent experience . . . also points to the likelihood of public rejection of such a proposal.

SECRETARY'S DECISION, *supra* note 24, at 63. The "recent experience" mentioned by Secretary Coleman appeared to be the public debate which led to Congressional repeal of the safety interlock provisions of F.M.V.S.S. 208. See Pub. L. No. 93-492, 88 Stat. 1470 (1974), *reprinted in* [1974] U.S. CODE & CONG. AD. NEWS 1701-02 (repealed safety interlock provision of Federal Motor Vehicle Safety Standard (F.M.V.S.S.) 208). Secretary Coleman assumed a passive belt use rate of



Reasons for non-enactment of seat belt use laws in the United States have been presented in several versions.<sup>101</sup> These reasons have been utilized by opponents of use legislation to prevent enactment of bills pending in over thirty states.<sup>102</sup> With the exception of at least one municipality, the Commonwealth of Puerto Rico and Rhode Island, no use laws are in effect in the United States.<sup>103</sup> This could be due to the belief that the American public will largely violate the law and that enforcement officials are effectively powerless. Regardless of whether congress will consider the question of mandatory seat belt use legislation, the State legislative branches should continue to do so.<sup>104</sup>

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only 60%, based on available data, which thereby indicated that 40% of the people whose vehicles were so equipped chose to defeat the system. SECRETARY'S DECISION, *supra* note 24, at A-8.

Another survey concluded that there was an 80% use rate in actual situations. OPINION RESEARCH CORP., SAFETY BELT USAGE: SURVEY OF CARS IN THE TRAFFIC POPULATION (Dec. 1978) (report prepared for U.S. Dep't. Transp.). See also TEKNEKRAN RESEARCH, INC., 1979 SURVEY OF PUBLIC PERCEPTIONS (July 1979) (report prepared for U.S. Dep't. Transp. (32% of respondents indicated that they would disconnect a passive belt system, 38% believed strongly in the passive system and 25% would tolerate such a system).

<sup>101</sup> One observer believed the reasons to be: 1) the National Highway Traffic Safety Ad. (NHTSA) belief that the American motorist cannot be made to buckle up; 2) emphasis on the air bag to denigrate seat belts; 3) the safety interlock experience; and 4) the absence of adequate data to document the benefits of mandatory use laws. C.H. Pulley, *Safety Belt Use Laws—The World Follows Australia's Leadership* in PROCEEDINGS OF THE 6TH INTERNATIONAL CONFERENCE OF THE INTERNATIONAL ASSOCIATION FOR ACCIDENT AND TRAFFIC MEDICINE 11-15 (1977).

Another commentator, reflecting on the Congressional attitude, concluded that it was highly unlikely that mandatory seat belt use laws would be enacted even though higher use rates could not be attained without them. His review of a report by the House Sub-Committee on Consumer Protection and Finance suggested that this conclusion was due to Congressional disdain, consumer resistance, lack of adequate enforcement resources and the difficulty of nighttime enforcement. See OCCUPANT PROTECTION, *supra* note 6, at 648.

<sup>102</sup> E.g., Mich. S. Bill No. 399 (1979); N.J. Assembly Bill No. 785 (1978). Among the various states, several have passed the legislation but only in one house of the legislature. See Pulley, *A Report of the Efforts Throughout the World to Increase Seat Belt Usage*, SYMPOSIUM, *supra* note 26, at 112.

<sup>103</sup> P.R. LAWS ANN. tit. 9, § 1212 (1975). The City of Brooklyn, Ohio probably was the first political subdivision in the United States to adopt a mandatory seat belt use law. The ordinance was adopted in 1966. CODIFIED ORDINANCES OF THE CITY OF BROOKLYN, 37.25. Adoption was premised upon the belief that seat belt use "... has caused a significant drop in bodily injury and deaths to motor vehicle passengers and operators using same when involved in automobile accidents." and because "... their use will curtail injury and death and the great pain, suffering and financial loss which are a consequence thereof." City of Brooklyn, Ohio, Ordinance No. 1966 - 18. Rhode Island requires persons driving public service vehicles on highways to wear a seatbelt. R.I. GEN. LAWS § 31-23-41 (1962).

<sup>104</sup> For purposes of this article, no position need be taken as to the relative merits of federal versus state legislation although state legislation may be more

Perhaps the most difficult question facing proponents of mandatory seat belt use legislation is whether such legislation will be effective. Mandatory use laws are in effect and proving beneficial in over twenty-five nations or major political subdivisions.<sup>105</sup> Similar predictions of ineffectiveness based on low use rates and perceived resistance have been avoided in these places through the utilization of public education campaigns along with use legislation.<sup>106</sup> By using education and legislation in tandem, countries have successfully increased seat belt use even where previous education drives, alone, often failed to substantially increase usage.<sup>107</sup> Despite these foreign successes, the educational effort in the United States has been largely uncoordinated and sporadic,<sup>108</sup> thereby

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likely to succeed. For a discussion of the federal/state distinction see *Occupant Protection*, *supra* note 6. In view of the federal effort to mandate passive restraint system and improve the comfort of seat belt systems, it is paradoxical that the federal government refuses to require its use on vehicle operators. It is economically wasteful to impose the costs of the research development and installation of such systems upon manufacturers and consumers alike while failing to obtain the injury prevention benefits.

<sup>105</sup> See, e.g., Note, *Reallocating the Risk of Loss*, *supra* note 27, at 103; Pulley, *supra* note 101, at 12.

<sup>106</sup> See R. Andreasson and K. Ross, *Effects of Sweden's Seat Belt Laws*, in PROCEEDINGS OF THE 6TH INTERNATIONAL CONFERENCE OF THE INTERNATIONAL ASSOCIATION FOR ACCIDENT AND TRAFFIC MEDICINE 45 (1977); J.P. Chockiewicz and B. Dubarry, *Effects of Mandatory Seat Belt Legislation in France*, *id.* at 40; O. Due, *The Danish Seat Belt Act*, *id.* at 70; K. Seidenstecher, *Laws on Mandatory Seat Belt Use in Germany and Short Evaluation of the International Literature on Seat Belts*, *supra* note 26, at 194; J.W. Snow, *Seat Belt Legislation in Ontario Canada: Its History and Effects*, SYMPOSIUM, *supra* note 26, at 199. Other nations such as Belgium, Israel, Finland, the Netherlands, Norway, Spain, Switzerland, and the Soviet Union have also adopted mandatory seat belt use laws. Pulley, *supra* note 101, at 18.

<sup>107</sup> See notes 105-06 *supra*.

<sup>108</sup> Public information campaigns have been undertaken by the federal and state governments, the National Safety Council, insurance companies and the automobile industry in an effort to increase belt use rates. NAT'L HIGHWAY TRAFFIC SAFETY AD., U.S. DEPT TRANSP., OCCUPANT PROTECTION PROGRAM REPORT NO. 2, at 7 (April, 1979). The National Highway and Transportation Safety Administration has contracted to provide 2.5 million brochures through 4,000 supermarkets to explain automatic restraint systems. The agency has also produced three versions of a film spot (lasting from 10 to 60 seconds) dealing with automatic restraints and made them available to 600 television stations for showing in their public service time. *Id.* at 25.

Many private organizations, particularly medical organizations, have joined in the educational effort. *Id.* at 26. The Insurance Institute for Highway Safety has produced several films, including "Crashes That Need Not Kill," which has been seen by millions on television and in movie theatres. *Id.* at 27. High schools have emphasized seat belt use in driver education courses.

The single most effective campaign has been the "buckle up for safety" theme introduced by the National Safety Council. This is the most frequently recalled educational message among a group of 1,500 licensed drivers questioned in a na-

achieving even less success in obtaining increased seat belt usage than that obtained in other nations.

It may be that as a result of long term educational efforts, even despite the lack of coordination, there have been changes in the attitudes and perceptions of the American public. To date these changes have not increased the use rate,<sup>109</sup> but the potential presently exists to capitalize upon them. The attitudes and perceptions of the American public in regard to safety belts and use laws are therefore not as clearly adverse as commonly believed. Ongoing public opinion surveys reflect changes in favor of belt use and mandatory seat belt use legislation.<sup>110</sup> Publication efforts have been extremely effective because drivers who remember seeing or hearing seat belt safety advertisements are "more likely to believe that safety belts protect an individual in the event of an automobile accident than drivers who did not recall any such message."<sup>111</sup>

Nearly 90% of licensed drivers believe that belts protect automobile occupants from injury during an accident. Yet many undervalue the utility of belt use and do not associate such use with safe driving. Future educational efforts should focus public attention on the nexus between use of seat belts and safe driving. One method by which states might emphasize the benefits of seat belt use would be to require all applicants for renewal of driver licenses to view a film depicting automobile collision simulations utilizing restrained and unrestrained dummies.<sup>112</sup>

Most drivers are unaware of the true risk of being involved in an accident (1 in 7 per year) or suffering a disabling injury due to an automobile accident (1 in 67 per year).<sup>113</sup> In one sample less than 25% recognized the actual risk of an accident and over one-third perceived the risk at 1 in a 1,000.<sup>114</sup> Although almost 50% of the group nationally surveyed virtually never wore seat belts, the majority favored man-

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tional sample. TEKNEKRON RESEARCH, INC., 1979 SURVEY OF PUBLIC PERCEPTIONS (July, 1979) (report prepared for U.S. Dep't Transp.).

<sup>109</sup> See note 62 *supra*.

<sup>110</sup> TEKNEKRON RESEARCH, INC., *supra* note 108, at 38.

<sup>111</sup> *Id.* at 67.

<sup>112</sup> *Id.* at 36. The administrative costs of such a procedure would be minimal. Preparation of the film could be performed by the NHTSA, the National Safety Council, the Insurance Institute, or the automotive industry. A similar procedure is currently in use by many states to stress the importance of safe driving to persons who have received certain types of traffic violations or who seek to have a suspended license reinstated.

<sup>113</sup> *Id.* at 10-12.

<sup>114</sup> *Id.* at 38. 84% were in favor of a law requiring all children less than five years old to ride in a special car safety seat. Over 60% were in favor of a law requiring anyone less than 18 years old to wear a seat belt while 52% favored such a law for everyone.

andatory use laws.<sup>115</sup> Only 28% of those surveyed strongly opposed a broad mandatory use law.<sup>116</sup>

Despite the public's failure to perceive the true risk of being involved in an automobile accident, the public evidences considerable concern over the possibility of being injured in an automobile accident.<sup>117</sup> Public appreciation of the dangers of automobile accident injuries can be made more realistic and their appraisal of seat belt use more accurate through comprehensive educational efforts. The experience in Sweden, Canada, the United Kingdom and elsewhere indicates that publicity and/or educational campaigns alone will not increase the use rate more than five to fifteen percent.<sup>118</sup>

Legislative compulsion complemented by adequate publicity and educational efforts has uniformly resulted in substantial and long lasting increases in seat belt use. The tandem approach of legislation and education is the means by which the injury reduction potential of seat belt restraint systems can best be realized. If this reasonable approach is implemented, thousands of American lives will be saved annually and tens of thousands of Americans will be spared serious injury.

### B. *The Constitutional Canard*

If a mandatory seat belt use law is adopted, it will probably be subjected to a constitutional attack. However, preliminary indications are that such legislation would be held constitutional.<sup>119</sup>

Although there appears to be no reported decision in regard to the few existing use laws in the United States or Puerto Rico,<sup>120</sup> there have been numerous decisions in the analogous field of compulsory wearing

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<sup>115</sup> *Id.* at 39.

<sup>116</sup> *Id.*

<sup>117</sup> NAT'L HIGHWAY TRAFFIC SAFETY AD., U.S. DEPT OF TRANS., PUBLIC ATTITUDES TOWARD PASSIVE RESTRAINT SYSTEMS 4-5 (August, 1978).

<sup>118</sup> SYMPOSIUM, *supra* note 26, at 118. However, mandatory use legislation coupled with strong educational efforts has resulted in significant and permanent increases in the use rate, reaching over 90% in some areas. *See generally*, N. Bohlin, *Twenty years of Safety Belt Experience and the Effect of Safety Belt Legislation in Sweden*, in SYMPOSIUM, *supra* note 26, at 199; Joubert, *Development and Effect of Seat Belt Laws in Australia*, Symposium, *supra* note 26 at 128.

<sup>119</sup> The Highway Safety Division of Virginia has reached this conclusion. *See* W. AMES, *THE CONSTITUTIONALITY OF MANDATORY SEAT BELT USE LEGISLATION* (Dec. 1972). The validity of motorcyclist mandatory headgear use laws has been discussed by many commentators. *See e.g.*, Note, *Constitutional Law—Validity of Safety Helmet Requirements*, 71 W. VA. L. REV. 191 (1969); Note, *Police Power, Motorcycle Crash Helmet Laws Relation to Public Welfare*, 1969 WIS. L. REV. 320; Comment, *Constitutionality of Mandatory Motorcycle Helmet Legislation*, 73 DICK. L. REV. 100 (1968).

<sup>120</sup> *See* note 103 *supra*.

of headgear for motorcyclists.<sup>121</sup> The headgear use statutes were obviously enacted to reduce injuries to motorcyclists. Given the similar underlying purposes for both types of legislation, drafters should be inclined to use constitutional headgear statutes as models for mandatory seat belt use laws.

Potential constitutional attacks would most likely fall within three categories: 1) the legislation is vague; 2) the legislation imposes an undue burden upon interstate commerce; and 3) that such legislation would violate the equal protection clause.<sup>122</sup> None of these challenges should be sufficient to overturn a well-drafted statute.

Concern over language problems supposedly inherent in drafting mandatory seat belt use legislation is not well-founded. While ambiguous or vague statutes are generally invalidated,<sup>123</sup> the legislative branch, fully aware of this, constitutional requirement, can readily draft a statute utilizing appropriately specific statutory language. The laws already in effect worldwide and in Puerto Rico can serve as models.<sup>124</sup>

In the analogous area of motorcycle headgear laws, two courts have considered and rejected claims that such laws impose an improper burden on interstate commerce.<sup>125</sup> A New York court, in *People v. Carmichael*,<sup>126</sup> reduced the issue to a single sentence: "a valid exercise of

<sup>121</sup> See generally, Annot., 32 A.L.R.3d 1270 (1970). Courts in over twenty states have upheld motorcyclist headgear use statutes and have refused most constitutional attacks. *Id.* However, a small number of judicial opinions have invalidated such legislation primarily on the basis of a perceived violation of the right to privacy. See *People v. Fries*, 42 Ill. 2d 446, 250 N.E.2d 149 (1969); *Evenhardt v. City of New Orleans*, 208 So.2d 423 (La. App. 1968), cert. denied, 395 U.S. 212 (1969); *American Motorcycle Ass'n v. Davids*, 11 Mich. App. 351, 158 N.W.2d 72 (1968), overruled, *City of Adrian*, 67 Mich. App. 133, 240 N.W.2d 298, aff'd, 398 Mich. 316, 247 N.W.2d 798 (1976); *State v. Betts*, 21 Ohio Misc. 175, 252 N.E.2d 866 (1969).

The Ohio decision of *State v. Betts*, rejected an earlier appellate decision from another county. *State v. Craig*, 19 Ohio App. 2d 29, 249 N.E.2d 75 (1969). A subsequent appellate decision has also upheld the Ohio legislation. *State v. Stouffer*, 28 App. 2d 229, 276 N.E.2d 651 (1971).

<sup>122</sup> U.S. CONST. amend. XIV.

<sup>123</sup> See, e.g., *Connally v. General Construction Co.*, 269 U.S. 385, 391 (1962).

<sup>124</sup> P.R. LAWS ANN. tit. 9, § 1212 (1976) provides:

(a) Any person who drives or rides as a passenger in a public thoroughfare in a motor vehicle which should be equipped with safety belts . . . and the belts of which are available and adequate to be used, shall be bound to fasten said belt around his body while the vehicle is being driven along the public thoroughfares.

(b) This section shall not apply: [to specified groups]

The penalty for violation is set forth in P.R. LAWS ANN. tit. 9, § 1221 (1976). Violation is a misdemeanor.

<sup>125</sup> See *Love v. Bell*, 465 P.2d 118 (Colo. 1970); *People v. Carmichael*, 56 Misc. 2d 388, 288 N.Y.S.2d 931 (1968).

<sup>126</sup> 56 Misc. 2d 388, 288 N.Y.S.2d 931 (1968).

police power is not rendered invalid because it may incidentally affect interstate commerce."<sup>127</sup>

In addition, courts might emphasize the minimal financial burden connected with complying with use statutes in upholding seat belt use laws. The imposition of seat belt use laws will not interfere with interstate commerce. The act of buckling a seat belt is completed within seconds and does not affect the ability of the driver to operate the vehicle. Rather, by assisting the driver to remain in place, the use of seat belts is arguably an aid to driving and is thus beneficial to interstate commerce. The stability provided by seat belts can help a driver retain control of his vehicle and avoid accidents, thereby promoting a smooth flow of traffic.<sup>128</sup>

Mandatory seat belt use laws also need not violate the equal protection clause of the fourteenth amendment. When a matter is properly subject to state regulation regarding public health, safety or morals, the legislation will be upheld upon a finding that there is a proper basis for it. A state enacting mandatory seat belt use legislation, even assuming some encroachment upon personal liberty, could meet the standard of a compelling interest as set forth in *Roe v. Wade*<sup>129</sup> and *Bates v. Little Rock*.<sup>130</sup> Such a law would be necessary to the accomplishment of a permissible state policy<sup>131</sup>—protection of the health and safety of its citizenry. If the infringement is not characterized as fundamental, the less stringent "rational basis" test<sup>132</sup> would be met.

In *Simon v. Sargent*,<sup>133</sup> a three judge federal district court relied upon evidence that motorcyclists were especially prone to serious head injury as a basis for upholding a Massachusetts statute.<sup>134</sup> The court stated that the Massachusetts legislature could distinguish between classes of vehicle users because of the legitimate state interest in protecting motorcycle riders from the additional dangers inherent in cycle

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<sup>127</sup> *Id.* at 394, 288 N.Y.S.2d at 936.

<sup>128</sup> See note 40 *supra* and accompanying text.

<sup>129</sup> 410 U.S. 133 (1973).

<sup>130</sup> 361 U.S. 516 (1960).

<sup>131</sup> *McLaughlin v. Florida*, 379 U.S. 184 (1964).

<sup>132</sup> See *New Orleans v. Duke*, 427 U.S. 297 (1976); *Williamson v. Lee Optical Co.*, 348 U.S. 483 (1955). See also *Ravin v. State*, 537 P.2d 494 (Alaska 1975) (right of privacy argument was invoked to challenge laws prohibiting adults from using marijuana in their homes); *Marcoux v. Attorney Gen.*, 375 N.E.2d 688 (Mass. 1978). The contested statute was upheld in *Marcoux* but was deemed invalid in *Ravin* due to an absence of an adequate state interest.

<sup>133</sup> 346 F. Supp. 277 (D.C. Mass.) *aff'd*, 409 U.S. 1020 (1972).

<sup>134</sup> See MASS. GEN. LAWS ANN. ch. 90 § 7 (West 1975). This statute was also upheld in *Commonwealth v. Howie*, 354 Mass. 769, 238 N.E.2d 373, *cert. denied*, 393 U.S. 999, (1968), and *Commonwealth v. Cowan*, 344 N.E.2d 419 (App. 1976). *Cowan* specifically rejected a claim that the statute violated a right to privacy.

driving.<sup>135</sup> Emphasis was placed on the fact that injuries to motorcyclists created costs not only to the injured party, but also to society in general.<sup>136</sup>

The added protection afforded by a motor vehicle, when compared to a motorcycle, is quite distinct from the protection needed when an automobile collision occurs. In many accident situations, the structure of the automobile is not capable of preventing injury that would be prevented had a seat belt been in use.<sup>137</sup> A legislature can readily discern a rational basis for imposing a safety belt use standard upon the motor vehicle occupant. The motor vehicle occupant is in a class distinct from the motorcyclist and thus in need of a different form of protection against injury and death. Just as a helmet provides a unique form of protection to the motorcyclist, seat belts provide a unique form of protection to the motor vehicle occupant.

In *People v. Bennett*<sup>138</sup> a lower New York court held that the improper special class argument was without merit, but also discussed the question of an asserted violation of the right to privacy. The court found that there was a rational basis and connection between the helmet use law and the safety purposes of such a law. The legislature was within its rights to determine that injuries to motorcyclists would be greater in the absence of helmets, therefore, the police power was properly invoked. The right to privacy was viewed as a limited right not affecting the legislation.<sup>139</sup> Other courts in the United States have also found this type of legislation valid because it protects both the individual and the general public.<sup>140</sup>

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<sup>135</sup> 346 F. Supp. at 279.

<sup>136</sup> The court concluded:

From the moment of injury, society picks the person up off the highway; delivers him to a municipal hospital and municipal doctors; provides him with unemployment compensation if, after recovery, he cannot replace his lost job, and, if, the injury causes permanent disability, may assume the responsibility for his and his family's continued subsistence. We do not understand a state of mind that permits plaintiff to think that only he himself is concerned.

*Id.* The economic factors supporting such legislation have been relied upon in other opinions. See, e.g., *State v. Beeman*, 541 P.2d 409 (Ariz. App. 1975); *State v. Acker*, 26 Utah 2d 104, 485 P.2d 1038 (1971); *State v. Laitiner*, 77 Wash. 2d 130, 459 P.2d 789 (1969), *cert. denied*, 397 U.S. 1055 (1970). In *State v. Acker*, the court observed: "Whenever a citizen becomes maimed or is killed, the entire public is affected to some degree. As John Donne suggested, each citizen is a clod of the entire whole, and when one citizen is diminished we all suffer." 26 Utah 2d at 106, 485 P.2d at 1039.

<sup>137</sup> See note 62 *supra*.

<sup>138</sup> 89 Misc. 2d 382, 391 N.Y.S.2d 506 (1977).

<sup>139</sup> *Id.* at 386; 391 N.Y.S.2d at 509.

<sup>140</sup> *State v. Also*, 11 Ariz. App. 227, 463 P.2d 122 (1969); *State v. Lee*, 51 Hawaii 516, 465 P.2d 573 (1970); *State v. Acker*, 26 Utah 2d 104, 485 P.2d 1038 (1971).

As desirable as seat belt use legislation may be, enactment of such laws in the near future cannot be anticipated. The judiciary can fill the legislative void through application of the seat belt defense. Such efforts are not adverse to public policy because the failure of the legislature to act is not necessarily a reflection of public opinion. Federal legislation specifically allows for a continuation of common law developments.<sup>141</sup> The remainder of this article explores how the judiciary can fill the legislative void through application of the seat belt defense.

## VI. SEAT BELT DEFENSE

Limitations on the use of the seat belt defense come from general evidence principles, tort law and products liability law. The gossamer barriers to use of the seat belt defense are surmountable.

### A. *Relevance and Related Issues*

Application of the seat belt defense requires submission of factual evidence to support contentions that either:

- 1) the injuries allegedly sustained by the plaintiff would have been reduced or prevented entirely; or
- 2) the accident would not have occurred thereby precluding recovery for any injuries.<sup>142</sup>

Under any legal theory of liability, factual evidence relating to seat belt use and its effects is admissible only if relevant. The Federal Rules of Evidence establish that all relevant evidence is admissible unless specifically proscribed.<sup>143</sup> Relevant evidence not proscribed under the rules can be excluded only if its probative value is outweighed by other

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<sup>141</sup> 15 U.S.C. § 1397(c) (1976) provides: "Compliance with any Federal motor vehicle safety standard issued under this subchapter does not exempt any person from any liability under common law." This provision has been interpreted to permit development of the "crashworthiness" theory as consistent with legislative goals. The Act does not indicate a Congressional intent to gain exclusive jurisdiction. *See, e.g., Larsen v. General Motors Corp.*, 391 F.2d 495 (8th Cir. 1968).

<sup>142</sup> The legal and engineering aspects of this assertion are distinct from those which support the claim of injury prevention or reduction in accidents caused by events unrelated to seat belt non-use and, therefore, will not be discussed herein. Similarly, seat belt design flaws or defects as a cause of an accident or injury are a distinct area and will also not be discussed. *See, e.g., Fox v. Ford Motor Co.*, 575 F.2d 774 (10th Cir. 1978); *Engberg v. Ford Motor Co.*, 205 N.W.2d 104 (S.D. 1974); *Austin v. Ford Motor Co.*, 86 Wis.2d 628, 273 N.W.2d 233 (1979).

<sup>143</sup> FED. R. EVID. 402. Similar rules apply in most or all state courts. *E.g., CAL. EVID. CODE* § 351-52. *See MCCORMICK ON EVIDENCE* § 184 (2d ed. E. CLEARY, 1972); James, *Relevancy, Probability and the Law*, 29 CALIF. L. REV. 689 (1941).



factors.<sup>144</sup> A general definition of relevance is provided in Federal Rule 401 as "... evidence having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence."<sup>145</sup> Despite its superficial clarity this, and any definition of relevance, is inherently ambiguous.

If an answer to a complaint is properly drafted, there is little doubt that it will assert an affirmative defense making testimony relating to seat belts relevant. The admissibility of such evidence will then be determined solely upon its probative value as weighed against the recognized bases for exclusion of relevant evidence. Such bases are set forth in the Federal Rules<sup>146</sup> and have been summarized as: creation of undue prejudice, hostility or sympathy;<sup>147</sup> creation of confusing, misleading or distracting tangential issues;<sup>148</sup> usurpation of more court time than the evidence merits;<sup>149</sup> and creation of unfair surprise.<sup>150</sup>

No valid argument can be made that a seat belt defense would create undue prejudice, hostility or sympathy. The "prejudice" resulting is of a substantive nature relating to a proper issue and thus is not of a nature which would merit exclusion. Rather, the exclusionary term "prejudice" is analogous to a concept of fairness; evidence is unfair if it could conveniently be offered in a manner which would engender less prejudice.<sup>151</sup> Although this interpretation might affect the manner in which seat belt evidence is introduced, it cannot bar the evidence *per se*. From a more general approach, the evidence is not prejudicial in that jurors are presumably already aware of the existence of seat belts, their own non-

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<sup>144</sup> FED. R. EVID. 403. *See generally* CAL. EVID. CODE § 352; MCCORMICK ON EVIDENCE § 185 (2d ed. E. CLEARY 1972); J. WIGMORE, EVIDENCE §§ 9-10 (3d ed. 1940). It is clear, at least to be relevant under the Federal rules of evidence, that the evidentiary fact submitted must relate to a factual or legal issue raised by the pleadings as interpreted by applicable rules of procedure and substantive law.

<sup>145</sup> FED. R. EVID. 401.

<sup>146</sup> FED. R. EVID. 403.

<sup>147</sup> *See, e.g.,* United States v. McRae, 593 F.2d 700 (5th Cir.), *cert. denied*, 444 U.S. 862 (1979); Lyda v. United States, 321 F.2d 788 (9th Cir. 1963); Byers v. Santiam Ford, Inc., 281 Or. 411, 574 P.2d 1122 (1978).

<sup>148</sup> *See, e.g.,* United States v. Cassasa, 588 F.2d 282 (9th Cir. 1978), *cert. denied*, 441 U.S. 909 (1979); Marquis v. Chrysler Corp., 577 F.2d 624 (9th Cir. 1978); United States v. Mangan, 575 F.2d 32 (2d Cir. 1978), *cert. denied*, 439 U.S. 931 (1978); Herman Schwabe, Inc. v. United Shoe Mach. Corp., 297 F.2d 906 (2d Cir. 1962).

<sup>149</sup> *See, e.g.,* L.E. Spitzer Co. Inc. v. Barron, 581 P.2d 213 (Ala. 1978); Jones v. Boeing Co., 153 N.W.2d 897 (N.D. 1967).

<sup>150</sup> *See, e.g.,* Stoelting v. Hauck, 32 N.J. 87, 159 A.2d 385 (1960); Balian v. General Corp., 121 N.J. Super. 118, 296 A.2d 317 (App. Div. 1972).

<sup>151</sup> *See* State v. Fuson, 91 N.M. 366, 574 P.2d 290 (Ct. App. 1978); P. ROTHSTEIN, FEDERAL RULES OF EVIDENCE 70.3 - 70.4 (1978).

use of the seat belts and that a seat belt is a safety device. By focusing on non-use, the defense may even unfortunately skew jurors against its position by creating an "I do not use them either" syndrome thereby resulting in an emotional bias in favor of the plaintiff based on the jurors own similar conduct.

Similarly, seat belt evidence should not be barred by claims that it falls within the purview of the concepts relating to confusion and judicial efficiency. Although the evidence will often be technical and complex, it is highly probative<sup>152</sup> and no more difficult to comprehend than other design testimony that will be properly presented in an automobile accident related action. Of course, defense counsel and witnesses must present the evidence in a clear convincing manner or it will be of no value. It is possible that such evidence will take considerable time to present in a cohesive and forceful fashion, but the time is justified by the probative value of the evidence. In proper circumstances, the court can impose such restrictions as are necessary for the efficient administration of a trial. Moreover, by taking judicial notice of the efficiency of seat belts as injury inhibitors, the court could greatly reduce the time needed for the presentation of this aspect of the case.<sup>153</sup>

Finally, the Federal Rules will not exclude relevant evidence because of alleged unfair surprise since modern discovery rules have largely eliminated the element of surprise in civil litigation.<sup>154</sup> In seat belt defense litigation, the likelihood of surprise is virtually non-existent as the defense will, of necessity, be asserted as an affirmative defense or raised in mitigation of damages in the pleadings. Aside from the pleadings, the nature of the facts to support the defense can be gleaned by plaintiff's counsel through proper use of the discovery rules.

### B. *Auto Design and Personal Injury Cases*

Issues pertaining to the seat belt defense arise in a variety of patterns. Out of these, three patterns predominate: personal injury actions where one car occupant sues the driver of another car; design defect or component malfunction litigation brought against an auto seller or manufacturer; and crashworthiness design litigation brought against sellers and manufacturers.

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<sup>152</sup> Evidence of a seat belt restraint system is important in evaluating the over-all safety design of the vehicle, which in turn is probative to the issue of whether the vehicle was defective or unreasonably dangerous. See notes 174-85 *infra* and accompanying text. Evidence presented by a competent witness may also establish that the injuries for which suit has been brought would have been prevented or reduced in accordance with either affirmative defenses or as a means to reduce damages consistent with established principles. See notes 187-212 *infra* and accompanying text.

<sup>153</sup> See notes 174-97 *infra* and accompanying text.

<sup>154</sup> See FED. R. CIV. P. 26-37. See also OHIO R. CIV. P. 26-37.

In non-design cases, the seat belt defense may often be asserted in the form of an allegation of contributory negligence or to support a claim that there was an absence of proximate cause between the accident and the injuries sustained. In such cases courts have tended to reject the defense or, alternatively, to treat it with great caution. This cautious approach is not merited in terms of the value of seat belts, but is somewhat supported by what is perceived to be a judicial reluctance to permit a defense which would totally bar an apparently innocent plaintiff from all recovery.

Two Ohio decisions illustrate this judicial caution. In *Bertsch v. Spears*,<sup>155</sup> it appears that plaintiff failed to wear an available seat belt and sustained a fractured jaw caused by his impact with the vehicle interior. Although no evidence was presented as to the effect a seat belt would have had on preventing the injury, the court addressed the issue and rejected the defense. Interestingly, the court noted that "[i]t may be that in a future case the evidence introduced or proffered will indicate that the failure to use a seat belt was a contributing factor in the occurrence of the accident or in producing or aggravating the plaintiff's injuries and that the issue should be submitted to the jury."<sup>156</sup>

The *Bertsch* opinion clearly indicates that evidence of failure to use a seat belt, given a proper foundation, would be admissible in design defect litigation and possibly in a pure negligence, personal injury action.<sup>157</sup> In *Roberts v. Bohm*,<sup>158</sup> apparently ignoring this interpretation of *Bertsch*, the court took a more restrictive position ruling without qualification that the seat belt defense was not available. *Roberts*, like *Bertsch*, was a pure negligence, personal injury action without design defect ramifications.

An Illinois court took a more realistic approach in *Kassella v. Stonitsch*,<sup>159</sup> which also concerned a non-design defect negligence action. During cross-examination of the plaintiff's orthopedic expert witness, it was admitted that seat belt utilization would have reduced injury. Plaintiff claimed to have no recall of whether the available seat belt had been in use. No further evidence on the issue was proffered and the trial court correctly ruled that no seat belt instruction to the jury was

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<sup>155</sup> 20 Ohio App. 2d 137, 252 N.E.2d 194 (6th Dist. 1969).

<sup>156</sup> *Id.* at 139, 252 N.E.2d at 196.

<sup>157</sup> *Id.* at 139, 252 N.E.2d at 196. This possibility was realized and applied by the court in *Newell v. Walker*, No. 78 Civ. 0220 (Lake Cty. C.P. July, 1980) (giving a seat belt charge to the jury in a crashworthiness action).

<sup>158</sup> 26 Ohio App. 2d 50, 269 N.E.2d 53 (Lake Cty. 7th Dist. Ct. App. 1971), *rev'd on other grounds sub nom.*, *Suchy v. Moore*, 29 Ohio St. 2d 99, 279 N.E.2d 878 (1971).

<sup>159</sup> 57 Ill. App. 3d 817, 373 N.E.2d 608 (1978). See also *Miller v. Haynes*, 454 S.W.2d 293 (Mo. App. 1970); *Miller v. Miller*, 273 N.C. 228, 160 S.E.2d 65 (1965).

necessary.<sup>160</sup> The appellate court affirmed, observing that the seat belt defense was not available as evidence of contributory negligence, but was permissible on the question of damages, provided competent evidence of a causal link between failure to wear the seat belt and the injuries sustained was introduced.<sup>161</sup> The opinion recognized that seat belt evidence was relevant to the determination of the liability issues under consideration. The appellate ruling was premised on an *absence* of sufficient evidence and not the *relevance* of available evidence.<sup>162</sup>

*Bertsch*, by implication, and *Kassela*, expressly, approved the seat belt defense in non-design cases. Both, however, exhibit a cautious approach and do not permit speculation. Arguments in support of the more restrictive view of *Roberts* cannot be logically or legally sustained. In non-design cases, competent seat belt evidence should be admissible and a proper jury instruction tendered, but only if adequately supported by the evidence.

In design defect litigation, arguments against admission of evidence in support of the seat belt defense are clearly without foundation.<sup>163</sup> Crashworthiness actions,<sup>164</sup> now recognized by the majority of courts despite sound criticism,<sup>165</sup> present the single most compelling area for recognition of the seat belt defense and admission of evidence in support thereof. In any design case, most poignantly a crashworthiness design case, it is paradoxical for a court to rule that a manufacturer can

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<sup>160</sup> See 57 Ill. App.3d at 820, 373 N.E.2d at 611.

<sup>161</sup> *Id.*, 373 N.E.2d at 611.

<sup>162</sup> See *Id.*, 373 N.E.2d at 612.

<sup>163</sup> See Hagarty, *Design Defects, Seat Belts and Second Injury*, 24 FED. INS. COUNSEL Q. 27 (1973); Robinson & Cullen, *Federal Court Rules Virginia Law Allows Evidence of Non-Use of Seat Belt*, 13 U. RICH. L. REV. 123 (1978); Symposium—*The Seat Belt Defense in Practice*, 53 MARQ. L. REV. 172 (1970); Recent Developments *Spier v. Barker*, 3 HOFSTRA L. REV. 883 (1975).

Traditional design defect litigation is concerned with a design factor that causes an injury producing occurrence similar to that caused by a manufacturing defect. Differences between manufacturing defects and design choice defects are detailed by many commentators. See Henderson, *Design Defect Litigation Revisited*, 61 CORNELL L. REV. 541 (1976); Henderson, *Judicial Review of Manufacturer's Concious Design Choices: The Limits of Adjudication*, 73 COLUM. L. REV. 1513 (1973); Hoenig, *Product Designs and Strict Tort Liability: Is There A Better Approach?*, 8 SW. U.L. REV. 109 (1976); Twerski, Weinstein, Donaher and Piehler, *The Use and Abuse of Warnings in Product Liability—Design Defect Litigation Comes of Age*, 61 CORNELL L. REV. 495 (1976).

<sup>164</sup> "Crashworthiness" is the term given to describe a motor vehicle's capacity to afford protection to a passenger against personal injury or death as a result of a motor vehicle accident. See 15 U.S.C. § 1901(4) (1976); Jeng v. Witters, 452 F. Supp. 1349 (M.D. Pa. 1978). See also Dreisonstok v. Volkswagenwerk A.G., 489 F.2d 1066 (4th Cir. 1974).

<sup>165</sup> See Hoenig and Goetz, *supra* note 42; Hoenig and Werber, *Automobile "Crashworthiness": an Untenable Doctrine*, 20 CLEV. ST. L. REV. 578 (1971).

be liable for the failure to design safety features into a product so as to reduce the likelihood of an accident or the potential for "enhanced" or "aggravated" injuries, while at the same time excluding evidence of a design feature directed to the reduction of such potential. The anomaly is heightened where a maintainable action can be brought if the seat restraint system fails, thereby permitting otherwise avoidable injuries to occur.<sup>166</sup>

Design defect litigation is plagued by legally complex questions including burden of proof, causation and the definitions of "defect," "unreasonably dangerous," or "enhanced injury." The definition of the term "defect" has been debated without adequate resolution since the inception of the strict tort liability doctrine.<sup>167</sup> Despite inherent legal-theoretical difficulties and technical issues, courts have recognized an increasing variety of design cases.<sup>168</sup>

Initial crashworthiness decisions followed a pure negligence theory of liability as enunciated in *Larsen v. General Motors Corp.*<sup>169</sup> More recent decisions have imposed crashworthiness liability under the doctrine of strict tort liability,<sup>170</sup> or pursuant to a breach of warranty theory.<sup>171</sup>

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<sup>166</sup> See *Fox v. Ford Motor Co.*, 575 F.2d 774 (10th Cir. 1978); *Enberg v. Ford Motor Co.*, 205 N.W.2d 104 (S.D. 1974).

<sup>167</sup> See *Caterpillar Tractor Co. v. Beck*, 593 P.2d 871 (Alaska 1979); *Barker v. Lull Engineering*, 20 Cal. 3d 413, 573 P.2d 443, 143 Cal. Rptr. 225 (1978); *Phillips v. Kimwood Mach. Co.*, 269 Or. 485, 525 P.2d 1033 (1974); *Freedman, Defect in the Product: The Necessary Basis for Products Liability in Tort and Warranty*, 49 VA. L. REV. 675 (1963); *Hoenig*, *supra* note 156; *Keeton, Product Liability and the Meaning of Defect*, 5 ST. MARY'S L.J. 30 (1973). Subsequent Oregon decisions illustrate the continued difficulty faced by trial courts in defining a defect and its relationship to foreseeability. See *Newman v. Utility Trailer & Equip. Co.*, 278 Or. 395, 564 P.2d 674 (1977); *Johnson v. Clark Equip. Co.*, 274 Or. 403, 547 P.2d 132 (1976). Similar problems are evident in many other jurisdictions.

<sup>168</sup> For example, crashworthiness concepts have been extended to include motorcycles which allegedly fail to protect against leg injuries sustained during a collision. *Nicolodi v. Harley-Davidson Motor Co.*, 370 So. 2d 68 (Fla. App. 1979). Even exterior vehicle design which could injure a pedestrian or a motorcyclist can raise a jury issue. See *Baker v. Chrysler Corp.*, 55 Cal. App.3d 710, 127 Cal. Rptr. 745 (1976) (pedestrian injured); *Knippen v. Ford Motor Co.*, 546 F.2d 993 (D.C. Cir. 1976) (motorcyclist injured).

<sup>169</sup> 391 F.2d 495 (8th Cir. 1968). As noted in a 1977 Illinois decision, *Buehler v. Whalen*, 70 Ill.2d 51, 374 N.E.2d 460 (1977), some twenty decisions from 1971 to 1977 accepted the crashworthiness doctrine under *Larsen* reasoning. These include: *Steonehocker v. General Motors Corp.*, 587 F.2d 151 (4th Cir. 1978); *Jeng v. Witters*, 452 F. Supp. 1349 (M.D. Pa. 1978); *Roberts v. May*, 583 P.2d 305 (Colo. App. 1978); *Elsasser v. American Motors Corp.*, 81 Mich. App. 379, 265 N.W.2d 339 (1978); *Chrysler Corp. v. Todorovich*, 580 P.2d 1123 (Wyo. 1978).

<sup>170</sup> See, e.g., *Jeng v. Witters*, 452 F. Supp. 1349 n.260 (M.D. Pa. 1978); *Roberts v. May*, 583 P.2d 305 (Colo. App. 1978); *Buehler v. Whalen*, 60 Ill.2d 51, 374 N.E.2d 460 (1977).

<sup>171</sup> See, e.g., *Back v. Wickes Corp.*, 378 N.E.2d 964, 968 (Mass. 1978) (amendments to the Massachusetts Uniform Commercial Code make a cause of action for

Thus, although the majority of states which have adopted crash-worthiness as a valid cause of action have done so, and continue to do so, under negligence principles,<sup>172</sup> negligence is not the sole theoretical basis for recovery in this type of design-defect litigation.<sup>173</sup>

Regardless of the underlying legal theory used in design defect action, seat belt evidence is relevant if the court properly recognizes that in such litigation, the product as a whole must be considered. The product must be considered in connection with its design goals and should only be compared to those products with similar design goals or criteria.<sup>174</sup> For example, a snub-nosed vehicle cannot be compared to a standard passenger car in a front-end collision case<sup>175</sup> nor a convertible to a hard-top vehicle in a roll-over case.<sup>176</sup> Similarly, an allegedly defective door latch cannot be considered without weighing other aspects of the vehicle structure which may have compensated for the latch design.<sup>177</sup>

The current trend of decisions reflects an acute awareness of these appropriate parameters of design defect litigation. A leading decision

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breach of warranty "as comprehensive as the strict liability theory of recovery"); *Elsasser v. American Motors Corp.*, 81 Mich. App. 379, 265 N.W.2d 339 (1978).

<sup>172</sup> See, e.g., *Buccery v. General Motors Corp.*, 60 Cal. App. 3d 533, 132 Cal. Rptr. 605 (1976); *Nicolodi v. Harley-Davidson Motor Co., Inc.*, 370 So. 2d 68 (Fla. 1979); *Farmer v. International Harvester Co.*, 97 Idaho 742, 553 P.2d 1306 (1976).

<sup>173</sup> See notes 170-71 *supra* and accompanying text. The distinction between the theories are blurred and a negligence overlay is discovered upon an analysis of virtually any of the decisions. See, e.g., *Jeng v. Witters*, 452 F. Supp. 1349 (M. D. Pa. 1978); *Back v. Wickes Corp.*, 378 N.E.2d 964 (Mass. 1978); *Elsasser v. American Motors Corp.*, 81 Mich. App. 379, 265 N.W.2d 339 (1978). The legal and practical problems inherent in design defect litigation suggest that reform is needed. *Henderson, Judicial Review of Manufacturer's Conscious Design Choices: The Limits of Adjudication*, 73 Colum. L. Rev. 541 (1976); *Hoenig, Product Designs and Strict Liability: Is There a Better Approach?*, 8 SW. U. L. REV. 109 (1976); *O'Connell, Elective No-Fault Liability by Contract—With or Without Enabling Statute*, 1975 U. ILL. L. F. 59 (1975); *Weinstein, Twerski, Piehler and Donaher, Product Liability: An Interaction of Law and Technology*, 12 DUQ. L. REV. 425 (1974).

<sup>174</sup> This need is recognized in the Traffic and Motor Vehicle Safety Act, 15 U.S.C. § 1392(f)(3) (1976), which provides that in presenting automobile safety standards the Secretary of the Department of Transportation must "consider whether any such proposed standard is reasonable, practicable and appropriate for the particular type of motor vehicle. . . ." *Id.* This and similar legislation dealing with installation of passive restraint systems support a staggered timetable for the introduction of such systems by manufacturers dependent upon vehicle size. See Fed. Motor Vehicle Safety Std. 208, 49 C.F.R. § 571.208, S.4.1.2. (1980). See also *Wilson v. Volkswagen of America, Inc.*, 445 F. Supp. 1368 (E.D. Va. 1978).

<sup>175</sup> See *Dreisonstok v. Volkswagenwerk A.G.*, 489 F.2d 1066 (4th Cir. 1974).

<sup>176</sup> See *Dyson v. General Motors Corp.*, 198 F. Supp. 1064 (E.D. Pa. 1969).

<sup>177</sup> See *Melia v. Ford Motor Co.*, 534 F.2d 795 (8th Cir. 1976); *Jeng v. Witters*, 452 F. Supp. 1349 (M.D. Pa. 1978).

properly applying *Larsen* crashworthiness principles is *Dreisonstok v. Volkswagenwerk A.G.*<sup>178</sup> Implicit throughout this opinion is a belief that the totality of the vehicle must be considered in determining whether an alleged defect exists. The seat belt restraint system is within the ambit of such considerations.

It, perhaps, may not be amiss to note that there is not substantial evidence to sustain a finding that as a result of the design of the Microbus, the plaintiff's injuries were enhanced. In fact, the records seem clear that in any event, plaintiff, who had made no endeavor to protect herself with a seat belt, would have received severe injuries, irrespective of the type of vehicle she may have been riding in.<sup>179</sup>

Had the court chosen, it could have readily qualified "Microbus" with language to indicate front end structure and/or the absence of energy absorbing devices. Instead the court referred to the vehicle as a whole and recognized that the seat belt system was a component part of an overall design.<sup>180</sup>

Shortly after the "whole vehicle" concept was implicitly recognized, another federal court of appeals adopted it. In *Melia v. Ford Motor Co.*,<sup>181</sup> the defendant contended that the district court judge failed to properly instruct the jury that they should consider the vehicle as a whole to determine whether the vehicle was defectively designed. The court of appeals agreed that this was the appropriate standard, but found that the trial court had so instructed the jury.<sup>182</sup> Evidence in regard to seat belts was also permitted. A similar position was taken in *Wilson v. Volkswagen of America, Inc.*,<sup>183</sup> in which the court set forth defendants' contentions and held that "[i]t is defendants' position that the jury should give cognizance to the full design of the automobile, including safety factors, when deciding whether the automobile was in fact defective."<sup>184</sup>

A seat belt restraint system is an integral part of modern day motor vehicle design. Its primary purpose is to provide a means of protecting

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<sup>178</sup> 489 F.2d 1066 (4th Cir. 1974). The plaintiff was a passenger in a Volkswagen Microbus which struck a telephone pole resulting in a serious leg injury. The plaintiff alleged that by minimizing the distance between the front end of the vehicle and the passenger compartment to provide additional cargo or passenger space the vehicle was without adequate "crush space" or sufficient devices to absorb the energy of frontal impacts. *Id.* at 1069.

<sup>179</sup> *Id.* at 1076.

<sup>180</sup> *Id.* at 1072.

<sup>181</sup> 534 F.2d 795 (8th Cir. 1976).

<sup>182</sup> *Id.* at 800.

<sup>183</sup> 445 F. Supp. 1368 (E.D. Va. 1978).

<sup>184</sup> *Id.* at 1371 (emphasis in original). See also *Caizzo v. Volkswagenwerk A.G.*, 468 F. Supp. 593, 606 (E.D.N.Y. 1979), *aff'd in part, rev'd in part*, No. 79-7419 (April 2, 1981).

the vehicle occupant from injury or death in motor vehicle accidents which are equally foreseeable by the manufacturer and occupant. Judges in design defect litigation should take into account the totality of the vehicle and view the product in this light. This principle should apply in negligence, strict tort liability and warranty actions with equal persuasiveness.

The presence of a seat belt restraint system is a factor which should be considered by the jury even in the absence of evidence establishing the effects of its use in the specific circumstances of a litigated accident. Evidence of the general benefits attained through seat belt use, or judicial notice of this fact, is adequate to support a jury instruction directing that the seat belt restraint system be considered when weighing the defect allegations. This principle is particularly applicable when the action is one in which the plaintiff seeks recovery for enhanced or aggravated injuries under the crashworthiness theory. It also applies in general design defect litigation. In both situations, a threshold question is the existence of a design defect. The presence of a seat belt is evidence of a probative fact tending to establish that the overall vehicle design was not defective in regard to its safety potential.

In a crashworthiness case, it is essential that the court permit evidence of the actual benefits which seat belt use would have provided. Under any underlying theory, the evidence is probative of the primary factual issue; *i.e.*, to what extent did the vehicle design enhance injuries? Conversely, the evidence is also probative to address the issue of to what extent did the vehicle design have the capacity to prevent injuries? Liability can be properly imposed only after both aspects of the issue are sent to the jury for evaluation. If a product's general design is relevant to questions of injury causation, that same design is, *a fortiori*, relevant to questions of injury prevention. Any other conclusion is untenable. The question truly before the courts is not the probative value of seat belt evidence,<sup>185</sup> but the legal issues to which such evidence may be properly directed.

The existence of a seat belt should always be viewed as relevant to the determination of vehicle design defect. Its existence can permit a jury to find that there was no defect, that the product was not unreasonably dangerous, that it was not negligently designed or that it was fit for its intended purpose and use.<sup>186</sup> This is true regardless of the

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<sup>185</sup> No case has been found that precluded seat belt evidence on the grounds of probative value.

<sup>186</sup> Similarly, seat structure, method of vehicle construction, utilization of energy absorbing steering columns, steering wheel and dashboard design, special window glass and other "designed in" safety features would seem to be properly admissible to establish that the overall vehicle was not designed defectively and did not present an unreasonable danger regardless of the legal theory selected by the plaintiff.



actual effect seat belt usage would have had in the particular circumstances of an accident. Some injuries are simply not avoidable and their occurrence does not establish fault or liability on the part of the seller or manufacturer of the vehicle. When the evidence is offered to establish that specific injuries would not have been sustained, expert testimony must be presented to establish this as a probable fact beyond mere speculation.<sup>187</sup> In this context, seat belt evidence is relevant (independent of plaintiff's negligence) to show: 1) that the product was not defective; 2) that affirmative defenses such as assumption of the risk and misuse are viable; and 3) that the measure of damages should be modified.

### C. Legal Basis For Admission of Seat Belt Evidence

#### I. Assumption of the Risk—Misuse

Failure to use a seat belt may operate as a complete bar to recovery by plaintiffs despite judicial reluctance to openly recognize this possibility.<sup>188</sup> Non-use of an available seat belt can constitute a misuse of the vehicle sufficient to be categorized as an assumption of the risk. It is generally recognized that the voluntary assumption of a known risk is a complete defense to an action based on strict tort liability as well as common law negligence.<sup>189</sup>

In *Melia v. Ford Motor Co.*,<sup>190</sup> the Eighth Circuit, in accordance with Nebraska's strict tort liability doctrine, affirmed a jury instruction which specified: "the defenses of assumption of the risk or misuse of the product are separate from negligence or contributory negligence and, therefore, you are to consider the defenses of assumption of the risk or misuse of the product."<sup>191</sup> Under this instruction both misuse and assumption would constitute complete defenses. If the jury found that

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<sup>187</sup> See *Kassela v. Stonitsch*, 57 Ill. App. 2d 817, 373 N.E.2d 608 (1978); *Austin v. Ford Motor Co.*, 86 Wis.2d 628, 273 N.W.2d 233 (1979).

<sup>188</sup> See generally Annot., 15 A.L.R.3d 1428 (1967) (uniform rejection of seat belt evidence as negligence *per se* or contributory negligence as a complete bar to recovery). For at least fifteen years, commentators have suggested that seat belt non-use need not act as a complete bar, unless all relevant injuries would have been prevented. See Kleist, *The Seat Belt Defense: An Exercise in Sophistry*, 18 HASTINGS L.J. 613, 620 (1967); Note, *Automobile Seat Belts: Protection for Defendants As Well As Motorists*, 38 S. CAL. L. REV. 732, 739 (1965); Note, *Seat Belts and Contributory Negligence* 12 S.D.L. REV. 130 (1967).

<sup>189</sup> See Bowman, *Practical Defense Problems—The Trial Lawyer's View*, 53 MARQ. L. REV. 191 (1970); Hagarty, *supra* note 163; Hoglund & Parsons, *Caveat Viator: The Duty to Wear Seat Belts Under Comparative Negligence Law*, 50 Wash. L. Rev. 1 (1974); Comment, *The Seat Belt Defense: A New Approach*, 38 FORDHAM L. REV. 94, 95-96 (1969-70); Recent Developments, *supra* note 163, at 886 n.15.

<sup>190</sup> 534 F.2d 795 (8th Cir. 1976).

<sup>191</sup> *Id.* at 802.

plaintiff misused the product, or assumed the risk of injury or enhanced injury (by failing to wear the available seat belt) recovery could be barred.<sup>192</sup> A similar instruction characterizing the failure of plaintiff to wear an available seat belt as a misuse of the product was approved in *General Motors Corp. v. Walden*.<sup>193</sup> The question of whether failure to use an available seat belt constitutes a misuse of the product in a strict tort liability action against a manufacturer or seller is usually regarded as a factual issue.<sup>194</sup> A better approach may be to treat the question as one of law.<sup>195</sup>

The applicability of the doctrine of assumption of risk to the seat belt defense may be viewed from two perspectives. One approach is to examine the specific risk of being hurt or injured more severely as a consequence of non-use of an available seat belt during an injury-causing accident. This view has troubled some commentators because of their frequent unwillingness either to interfere with an automobile occupant's "freedom of choice" not to use seat belts<sup>196</sup> or to impose upon motorists

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<sup>192</sup> *Id.* at 801. The reasoning for this result, typical of jurisdictions which have adopted section 402A of the Restatement (Second) of Torts was premised upon comment *n* to that section. See RESTATEMENT (SECOND) OF TORTS § 402A, comment *n* (1965).

<sup>193</sup> 406 F.2d 606, 609 (10th Cir. 1969).

<sup>194</sup> See, e.g., *Melia v. Ford Motor Co.*, 534 F.2d 795 (8th Cir. 1976); *General Motors Corp. v. Walden*, 406 F.2d 606 (10th Cir. 1969). Even where a passenger was injured in a crashworthiness design-defect case while wearing only a lap belt (the vehicle had a shoulder harness), the question of whether the failure to use the available harness was held to be a jury question. *Roberts v. May*, 583 P.2d 305 (Colo. App. 1978).

The *Roberts* court stated:

The crucial question under the misuse defense is whether "misuse by the injured party [was] not reasonably anticipated by the manufacturer." Here, assuming that plaintiff's failure to wear the shoulder restraint was a "misuse," the question of whether defendant should have foreseen that misuse is a question for the trier of fact. Similarly, assuming plaintiff was aware of the risk she was running by using only the lap belt, the question of whether her voluntary choice in accepting that risk was unreasonable is also a question which should be left to the jury.

*Id.* at 309.

<sup>195</sup> Compare, *Roberts v. May*, 583 P.2d at 308-09. See also notes 253-76 *infra* and accompanying text.

<sup>196</sup> Although the "freedom of choice" argument has been advanced from time to time, see, e.g., Kleist, *supra* note 188, it is not sound:

There are two answers to this argument. First, the standard of care in negligence has always been an objective one. Thus it should not matter that the plaintiff held an honest belief that seat belts are dangerous, that the plaintiff had never seen a seat belt, or that the plaintiff never gave any thought to wearing a belt. What the plaintiff's subjective view of the situation is, or what he thinks or believes is good for himself at the time, cannot have any effect on the reasonable person standard against which his conduct must be measured. The second answer is that

an obligation to anticipate accidents.<sup>197</sup> Such reluctance has been properly criticized as inconsistent with the duty of foreseeability imposed upon manufacturers through the crashworthiness doctrine<sup>198</sup> and also with other aspects of tort law which impose upon an actor various obligations to take precautions against dangers that are cognizable and somewhat predictable.<sup>199</sup>

Efforts to focus upon that part of the doctrine of assumption of risk which requires the anticipation and acceptance of a known danger<sup>200</sup> are unconvincing. Some of the confusion derives from an imprecise definition of the risks assumed in the non-use of an available seat belt. Thus,

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if the plaintiff insists on the freedom to act according to his personal views or comfort, he cannot then expect the defendant to bear the loss that results when his decision turn out to be the wrong one.

Slatter, *Seat Belts and Contributory Negligence*, 4 DALHOUSIE L.J. 96 100-01 (1977-78). See also O'Donnell, *Design Litigation and Strict Liability: The Problem of Jury Instructions Which Do Not Instruct*, 56 U. DET. J. URB. L. 1051 (1979); Comment, *Occupant Protection*, *supra* note 6.

<sup>197</sup> See *Nash v. Kamrath*, 21 Ariz. App. 530, 521 P.2d 161, 163 (1974); *Remington v. Arndt*, 28 Conn. Supp. 289, 291, 159 A.2d 145, 146 (1969); *Jurgensen v. Schirmer Transp. Co.*, 242 Minn. 157, 64 N.W.2d 530 (1954); *Roberts v. Bohm*, 26 Ohio App. 2d 50, 58, 269 N.E.2d 53, 59 (1971); *Fields v. Volkswagen of America, Inc.*, 555 P.2d 48 (Okla. 1976); *Kleist*, *supra* note 188, at 621.

<sup>198</sup> See *Larsen v. General Motors Corp.*, 391 F.2d 495 (8th Cir. 1968). *Larsen* and its progeny have held that while automobiles are not intended to collide with other vehicles such collisions are foreseeable. Automobile manufacturers have a duty to exercise reasonable care in the design of their vehicles to minimize injury as much as possible in those foreseeable accidents. See, e.g., *Huddell v. Levin*, 537 F.2d 726 (3d Cir. 1976); *Polk v. Ford Motor Co.*, 529 F.2d 259 (8th Cir. 1976); *Perez v. Ford Motor Co.*, 497 F.2d 82 (5th Cir. 1976); *Turcotte v. Ford Motor Co.*, 494 F.2d 173 (1st Cir. 1974); *Fortunato v. Ford Motor Co.*, 464 F.2d 962 (2d Cir. 1972); *Bremier v. Volkswagen of America, Inc.*, 340 F. Supp. 949 (D.D.C. 1972); *Grundamis v. British Motor Corp.*, 308 F. Supp. 303 (E.D. Wis. 1970); *Volkswagen of America, Inc. v. Young*, 272 Md. 201, 321 A.2d 737 (1974); *Brandenberger v. Toyota Motor Sales*, 162 Mont. 506, 513 P.2d 268 (1973); *Bolm v. Triumph Corp.*, 33 N.Y.2d 151, 305 N.E.2d 769, 350 N.Y.S.2d 644 (1973).

<sup>199</sup> See notes 200-13 *infra* and accompanying text.

<sup>200</sup> Dean Prosser's discussion of the doctrine of assumption of the risk describes three instances in which the doctrine arises, each of which involves some level of knowledge on the part of the actor:

In its simplest and primary sense, assumption of risk means that the plaintiff, in advance, has given his consent to relieve the defendant of an obligation of conduct toward him, and to take his chance of injury from a *known* risk arising from what the defendant is to do or leave undone . . . .

A second . . . situation, where the plaintiff voluntarily enters into some relation with the defendant, with *knowledge* that the defendant will not protect him against the risk . . . .

In the third type of situation the plaintiff, *aware* of a risk already created by the negligence of the defendant, proceeds voluntarily to encounter it. . . .

W. PROSSER, LAW OF TORTS 440 (4th ed. 1971) (emphasis added).

for example, in *Melia*,<sup>201</sup> after discussing the "known danger" aspect of the Restatement (Second) of Torts' explanation of the doctrine of assumption of risk,<sup>202</sup> the appellate court decided that there was no assumption of risk.<sup>203</sup> It did so because it found the plaintiff did not intend to encounter the other driver's failure to observe a red light, ignoring the fact that the plaintiff's non-use of a seat belt, in itself, could have been an assumption of risk.<sup>204</sup> The argument that a plaintiff alleging design defects should not be deemed to have assumed a risk of enhanced injuries resulting from failure to use a seat belt misses the point as to the risk assumed. It is not the awareness of a risk of a specific defect as to which the risk of injury is alone assumed, but rather the risk of injury from the myriad of causes of automobile accidents which endanger the plaintiff's safety.

By definition, a "known" risk of future injury is merely a future danger with a substantial degree of foreseeability.<sup>205</sup> Conceptually, a danger which is foreseeable falls entirely within the Restatement's definition of being one which is "known," provided the probability of its occurrence is high enough or the magnitude of its consequences is great enough.<sup>206</sup> The doctrine of crashworthiness is premised upon a judicial

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<sup>201</sup> *Melia v. Ford Motor Co.*, 534 F.2d 795 (8th Cir. 1976). In *Melia*, the court's consideration of assumption of risk focused upon the conduct of having failed to use the available seat belt. It was held that "[t]he trial court instructed that if the jury found that in failing to wear the seat belt or lock the door, the decedent misused the product or assumed the risk of injury, recovery would be barred. The jury was properly allowed to pass on these issues." *Id.* at 799. Nevertheless, when the court discussed the "known dangers" aspect of the assumption doctrine contained in section 402A of the Restatement (Second) of Torts, it did so *only* in the context of the claim that the plaintiff was contributorily negligent for having entered the intersection on a red light. Thus, it was in response to the defense of contributory negligence, not assumption of the risk, that the court held: "Clearly, there is no evidence that the decedent's alleged conduct of entering an intersection on a red light was intentional rather than inadvertent. The defense of assumption of risk under Nebraska law 'applies to *known dangers* and not to those things from which, in possibility, danger may flow'. . . ." *Id.* at 801 (emphasis in original).

<sup>202</sup> RESTATEMENT (SECOND) OF TORTS § 402A comment n (1965).

<sup>203</sup> 534 F.2d at 801.

<sup>204</sup> *Id.*

<sup>205</sup> RESTATEMENT (SECOND) OF TORTS § 496D comment b (1965).

<sup>206</sup> Learned Hand's formula for determining when a duty exists to take precautions against damages has often been recited as a sound basis for dealing with this question. In *United States v. Carroll Towing Co.*, 159 F.2d 169 (1947), Judge Hand stated that liability depends upon whether the probability of harm multiplied by the severity of damage outweighs the burden of taking adequate precautions against the occurrence. *Id.* at 173. Dean Prosser's test is similar. See W. PROSSER, *supra* note 200, at 419.

Given such criteria, which are reasonable and logical in the context of the Restatement's formulation of the doctrine of assumption of the risk, see notes

determination that automobile drivers will have accidents and that manufacturers must anticipate the occurrence of those collisions.<sup>207</sup> In recent years with media safety campaigns—billboards and publications stressing the value of “buckling up”—the “reasonable man” cannot fairly be said to be unaware that seat belts prevent injuries and save lives.<sup>208</sup> The hazards of highway travel are a fact of American life, so obvious to all that there can be no question that accidents in general are foreseeable, although a particular accident may not be.<sup>209</sup> It is hardly unreasonable to permit evidence of non-use of an available seat belt to support a defense of assumption of risk, especially in a crashworthiness design case.

The second approach to the admissibility of seat belt evidence based on the assumption of the risk doctrine concerns the substance of the crashworthiness design liability theory. In determining whether a manufacturer's design was the proximate cause of enhanced injuries, courts have held that it is the *total* vehicle which must be considered, not just the allegedly defective component.<sup>210</sup> In considering the *whole* vehicle, the courts have deemed the determinative factor in the crashworthiness evaluation to be the adequacy of the overall design,<sup>211</sup>

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201-05 *supra*, the safest ground for the courts would be to adopt a position that the great risk of serious injury, combined with the frequency of serious accidents would make non-use of an available seat belt “reasonable” only in the most unusual situations. See Comment, *The Failure to Use Seat Belts as a Basis for Establishing Contributory Negligence, Barring Recovery for Personal Defense Problems—The Expert's View*, 53 MARQ. L. REV. 203 (1970). See also Miller, *Crashworthiness of Automobiles*, SCIENTIFIC AM., Feb. 1973, at 81; accord, *Spier v. Barker*, 35 N.Y.2d 444, 452, 363 N.Y.S.2d 916, 922, 323 N.E.2d 164, 168 (1974).

<sup>207</sup> The initial reaction to *Larsen v. General Motors Corp.*, 391 F.2d 495 (8th Cir. 1968), was often one of concern that the court was attempting to equate foreseeability with duty. See, e.g., Hoenig & Goetz, *supra* note 42, at 22. More recently, however, the test has been clarified as being whether the manufacturer created an unreasonable risk of harm in the event the foreseeable collision occurred, not whether injury was foreseeable in such event. See Green, *Foreseeability in Negligence Law*, 61 COLUM. L. REV. 1401, 1417-18 (1961).

<sup>208</sup> Hoglund & Parsons, *supra* note 189, at 13.

<sup>209</sup> Hagarty, *supra* note 163, at 27.

<sup>210</sup> See notes 174-85 *supra* and accompanying text. This is also true from a purely technical approach. See Trinca, *Medical Aspects of Seat Belt Usage*, in SYMPOSIUM, *supra* note 26.

<sup>211</sup> See, e.g., *Melia v. Ford Motor Co.*, 534 F.2d 795 (8th Cir. 1976); *Dreisentok v. Volkswagenwerk, A.G.*, 489 F.2d 1066 (4th Cir. 1974); *Wilson v. Volkswagen of America, Inc.*, 445 F. Supp. 1368 (E.D. Va. 1978). As the court stated in *Melia*:

No doubt the manufacturers of automobiles could design and build an automobile with the strength and crash-damage resistance features of an M-2 army tank. I believe the average and reasonable automobile user desires only a reasonably safe, economical form of motor transportation. No greater burden of design-performance ought to be imposed upon automobile manufacturers by either judge or jury.

534 F.2d at 805.

but courts have not always seized upon the correlative perspective of the vehicle user. As a question of assumption of the risk, evidence of the non-use of an available seat belt should be admissible to prove that the occupant assumed a risk of enhanced injury from the intentional and voluntary failure to utilize an important safety feature of that total vehicle design—the seat belt. In the context of the assumption of the risk doctrine, the fact that a seat belt provides far less protection when sat upon than when properly affixed is “known.” Its non-use thereby constitutes a use of the total vehicle in a condition which is less protective of the occupant *as a whole* than when the seat belt is properly worn. There is no logical reason to apply a different definition of “unreasonably dangerous” when referring to a vehicle’s crashworthiness as opposed to referring to the conduct of an occupant who, by forsaking an available seat belt, assumes the risk that a subsequent accident will result in enhanced injuries.<sup>212</sup>

The concepts of knowledge inherent in the assumption doctrine and foreseeability incorporated into the crashworthiness doctrine are not logically distinguishable. Any such distinction is at best one of degree of certainty, not kind. It is the clear foreseeability of injury causing accidents which leads to the invocation of the doctrine of assumption of the risk. The RESTATEMENT (SECOND) OF TORTS recognizes in its discussion of assumption of the risk that a passenger can be barred from any recovery because of the foreseeability of an injury-causing collision on the highways and “suggests that the hazards of a collision are so well known and recognized that they compel a person’s course of conduct to avoid even risking those dangers.”<sup>213</sup>

## II. Proximate Cause

The otherwise clear distinction between liability defenses, (assumption of the risk), and damage-quantification issues, (mitigation of damages, avoidable consequences and comparative fault), becomes blurred at the conceptual barrier of proximate cause. Under any theory of

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<sup>212</sup> As exemplified in *Miller v. Miller*, 273 N.C. 228, 160 S.E.2d 65 (1968), some courts have improperly rejected seat belt evidence because of their perception of statistics establishing that only a minority of automobile occupants utilize available seat belts. The “average motorist” referred to in *Miller* embodies an evaluation of *actual* persons which is inconsistent with the law’s hypothetical *reasonable man* standard. The appropriate legal standard is the reasonable man, not the average man. If the reasonable man would utilize an available seat belt, then the average man’s failure to do so is negligent conduct. “Neglect of duty does not cease by repetition to be neglect of duty.” *Bank of Montreal v. Dominion Guarantee Co.*, [1930] A.C. 659, 666, (Lord Tomlin), *cited in* Comment, *Torts - Seat Belts - Contributory Negligence - Position of English Courts*, 53 CANADIAN B. REV. 113, 119 (1975). See notes 253-65 *infra* and accompanying text for further discussion of the reasonable man standard.

<sup>213</sup> Hoenig and Goetz, *supra* note 42 at 72-73.

liability, be it traditional negligence, breach of warranty or strict liability, the plaintiff can only recover for those damages which are proven to have been proximately caused by the allegedly wrongful conduct of the defendant.<sup>214</sup> Whether the evidence in a given case demonstrates that only some of the injuries were proximately caused by the failure to use an available seat belt, or that all of the injuries could have been avoided by such use may be as a practical matter, all that characterizes the issue as one of damages or liability. A defendant is simply not liable for damages which were not proximately caused by his conduct, regardless of the underlying cause of action.

If the non-use of an available seat belt can be proven by competent evidence to have been the proximate cause or an aggravating cause of the plaintiff's injuries, recovery for the injuries so caused or aggravated should be barred.<sup>215</sup> Proximate cause should be measured, at least in a strict liability action and other matters wherein the RESTATEMENT (SECOND) OF TORTS applies, by the substantial factor test *i.e.*, whether the failure to wear the available seat belt was a substantial factor in causing injury.<sup>216</sup> The burden of proof on this particular application of the concept of proximate cause necessarily rests with the defendant.<sup>217</sup> In *Truman v. Vargas*,<sup>218</sup> the appellate court implicitly approved the trial court's determination that the jury could properly consider expert testimony which was directed to the question of whether non-use of the available seat belt caused all or some of the plaintiff's injuries. The court of appeals held:

Upon a retrial the court or jury will determine whether in the exercise of ordinary care Truman should have used the seat belt; expert testimony will be required to prove whether Truman would have been injured, and, if so, the extent of the in-

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<sup>214</sup> PROSSER, *supra* note 200 at 236.

<sup>215</sup> In *Dziedzic v. St. John's Cleaner's & Shirt Launderers, Inc.*, 53 N.J. 157, 249 A.2d 382 (1969), an analogy to the seat belt defense was used to reject the affirmative defense of contributory negligence because of the absence of competent evidence to prove that the plaintiff was more severely injured due to her failure to be seated. *Id.* at 385. *See also* *General Motors Corp. v. Walden*, 406 F.2d 606, (10th Cir. 1969); *Pritts v. Walter Lowrey Trucking Co.*, 400 F. Supp. 867 (W.D. Pa. 1975).

<sup>216</sup> RESTATEMENT (SECOND) OF TORTS § 431 (1965). Comment *a* provides: In order to be a legal cause of another's harm, it is not enough that the harm would not have occurred had the actor not been negligent. . . . The negligence must also be a substantial factor in bringing about the plaintiff's harm. The word "substantial" is used to denote the fact that the defendant's conduct has such an effect in producing the harm as to lead reasonable men to regard it as a cause, using that word in the popular sense. . . .

<sup>217</sup> *See, e.g., Truman v. Vargas*, 274 Cal. App.2d 976, 80 Cal. Rptr. 373 (1960).

<sup>218</sup> 274 Cal. App.2d 976, 80 Cal. Rptr. 373 (1960).

juries he would have sustained if he had been using the seat belt; the burden of going forward upon this issue will be upon the defendant.<sup>219</sup>

The importance of the proximate cause requirement is particularly clear in crashworthiness cases where liability is premised upon a claim that injuries sustained in an accident were enhanced because of a design defect in the vehicle. The natural and unavoidable corollary of this requirement is that no defendant in such a case will be held liable for injuries which would have occurred absent the alleged design or manufacturing defect. "[T]he manufacturer should be liable for that portion of the damage or injury caused by the defective design over and above the damage or injury caused that probably would have occurred as a result of the impact or collision absent the defective design."<sup>220</sup>

The traditional "but for" test associated with questions of proximate causation is one for the trier of fact to resolve.<sup>221</sup> The trier cannot be expected to fairly determine whether all or some injuries were proximately caused by the vehicle design unless evidence of the failure to use the available seat belt and the consequences thereof is admissible.

### III. Mitigation of Damages and Avoidable Consequences

In an increasing number of jurisdictions, evidence of non-use of an available seat belt has been admitted for purposes of allowing juries to determine whether to diminish recoverable damages because of an adequate showing of a causal connection between such non-use and all or some of the injuries sustained.<sup>222</sup>

Admission of seat belt evidence to mitigate damages is based upon the requirement that the failure to use the available restraint is "a

<sup>219</sup> *Id.* at 980-81, 80 Cal. Rptr. at 377-78.

<sup>220</sup> *Ellithorpe v. Ford Motor Co.*, 503 S.W.2d 516, 522-23 (Tenn. 1973).

<sup>221</sup> The question of whether the failure to utilize the seat belt is a "but for" cause of the injuries sustained has always been within the province of the fact-finder rather than for legislatures to determine. It must be considered in each case upon the facts made available to the trier of fact.

<sup>222</sup> *E.g.*, *Mays v. Dealers Transit, Inc.*, 441 F.2d 1344 (7th Cir. 1971) (applying Indiana law); *Glover v. Daniels*, 310 F. Supp. 750 (N.D. Miss. 1970); *Josel v. Rossi*, 7 Ill. App. 3d 1091, 288 N.E.2d 677 (1972); *Spier v. Barker*, 35 N.Y.2d 444, 323 N.E.2d 164 (1974); *Sams v. Sams*, 247 S.C. 467, 148 S.E.2d 154 (1966); *See generally* authorities collected in, Annot. 80 A.L.R.3d 1033 (1977).

The recent trend, especially in crashworthiness cases, establishes the admissibility of seat belt non-use. *See Melia v. Ford Motor Co.*, 534 F.2d 795 (8th Cir. 1976); *Wilson v. Volkswagen of America, Inc.*, 445 F. Supp. 1368 (E.D. Va. 1978); *Daly v. GMC*, 144 Cal. Rptr. 380, 575 P.2d 1162 (1978); *Roberts v. May*, 583 P.2d 305 (Colo. App. 1978); *Kassella v. Stonitsch*, 57 Ill. App. 2d 817, 373 N.E.2d 608 (1978); *Spier v. Barker*, 35 N.Y.2d 444, 323 N.E.2d 164 (1974). Over twenty states have now indicated seat belt non-use would be admissible in proper circumstances.



substantial contributing factor in increasing the harm which ensues.”<sup>223</sup> Courts and commentators have had some difficulty applying this doctrine, whether termed “mitigation of damages” or “avoidable consequences,”<sup>224</sup> partially because the culpable act of failing to use the available seat belt occurs prior to the injury-causing collision.<sup>225</sup> Others, including Dean Prosser, have referred to the use of this theory of damage reduction, especially in crashworthiness cases, as “the better view unless we are to place an entirely artificial emphasis upon the moment of impact. . . .”<sup>226</sup> The Restatement (Second) of Torts also approves apportionment of damages for a plaintiff’s antecedent negligence.<sup>227</sup>

A second judicial statement of the use of the seat belt defense for reducing recoverable damages, especially in a crashworthiness case, was made in *Wilson v. Volkswagen of America*.<sup>228</sup> After rejecting evidence of the non-use of a seat belt as a complete bar to recovery, the court specifically allowed evidence to be presented as to whether Wilson’s injuries, allegedly “enhanced” by the design defect of the defendant’s vehicle, would have been less severe had Wilson used the available seat belt.<sup>229</sup> The burden of proving, by competent expert testimony, the effect that seat belt use would have had in reducing or eliminating the specific injuries was placed squarely upon the defendant. Once sufficient evidence has been presented to allow the issue to reach the jury, the court succinctly set forth the role that such non-use evidence would play:

The failure by plaintiff to wear a seat belt, even if unreasonable, is not in and of itself a bar to his recovery. However, if you find

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<sup>223</sup> *Barry v. Coca-Cola Co.*, 99 N.J. Super. 270, 239 A.2d 273, 276 (1967). The *Barry* opinion explained the distinction between traditional mitigation of damages, and “antecedent negligence” which may be found in seat belt cases when the defendant seeks mitigation of damages. Based on the record, the court found no evidence to establish that the plaintiff’s failure to wear a seat belt resulted in increased injuries. Thus, the court was able to resolve the legal issues it had raised on the narrow ground of inadequate facts to support the defense. On the broader issue of the availability of this defense, the court specifically refrained from taking a position since the evidence did not require that it do so. It appears that had proper evidence been proffered, the court would have admitted it in relation to the damages question.

<sup>224</sup> See, e.g., *McCord v. Green*, 362 A.2d 720, 725 (D.C. Cir. 1976); *Romankewicz v. Black*, 16 Mich. App. 217, 184 N.W.2d 367 (1970); *Kjellman v. Richards*, 82 Wash.2d 766, 514 P.2d 134 (1973); *Derheim v. N. Fiorito Co.*, 80 Wash.2d 161, 492 P.2d 1030 (1972).

<sup>225</sup> See W. PROSSER, *supra* note 200, at 422-24; J. STEIN, DAMAGES AND RECOVERY 215-18 (1972); Robinson and Cullen, *supra* note 157, at 127.

<sup>226</sup> W. PROSSER, *supra* note 200, at 423-24.

<sup>227</sup> See RESTATEMENT (SECOND) OF TORTS, § 465, comment c (1965).

<sup>228</sup> 445 F. Supp. 1368 (E.D. Va. 1978).

<sup>229</sup> *Id.* at 1372-73.

that it was unreasonable for the plaintiff not to use a seat belt, and that he would not have received some or all of his injuries had he used the seat belt, then you may not award any damages for those injuries you find he would not have received had he used the seat belt. The burden of proving that it was unreasonable not to use the seat belt rests upon the defendant, as does the burden of proving that some or all of plaintiff's injuries would not have been received had he used the seat belt.<sup>230</sup>

The decision in *Spier v. Barker*,<sup>231</sup> on which *Wilson* and other cases permitting the seat belt defense on the question of damages have frequently relied, presents a full and clear development of the concept by which a plaintiff's antecedent conduct justifies a jury's reduction of recoverable damages. While rejecting defense efforts to advance theories based upon a claim that non-use constituted negligence *per se*<sup>232</sup> or contributory negligence,<sup>233</sup> the court of appeals held that the non-use of an available seat belt is a factor the jury can consider in determining whether the plaintiff has exercised due care in avoiding or mitigating injury.<sup>234</sup>

Despite formal, traditional application of the doctrines of mitigation and avoidable consequences to post-accident events, the admissibility of evidence of seat belt non-use is peculiarly appropriate where, as the *Spier* court noted, "the seat belt affords the automobile occupant an unusual and ordinarily unavailable means by which he or she may minimize his or her damages *prior* to the accident"<sup>235</sup> and "there can be no doubt whatsoever as to the efficacy of the automobile seat belt in

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<sup>230</sup> *Id.* at 1373.

<sup>231</sup> 35 N.Y.2d 444, 363 N.Y.S.2d 916, 323 N.E.2d 164 (1974).

<sup>232</sup> The rationale of non-use of an available seat belt as negligence *per se* has been consistently rejected, usually upon the grounds that applicable statutes mandating installation of seat belts do not also mandate their use. *See, e.g.,* Remington v. Arndt, 28 Conn. Supp. 289, 259 A.2d 145 (1969); Cierpisz v. Singleton, 247 Md. 215, 230 A.2d 629 (1967); Romankewicz v. Black, 16 Mich. App. 119, 167 N.W.2d 606 (1969); Miller v. Miller, 273 N.C. 228, 160 S.E.2d 65 (1968); Robinson v. Lewis, 254 Or. 52, 457 P.2d 483 (1969); Bentzler v. Braun, 34 Wis.2d 362, 149 N.W.2d 626 (1967).

Although negligence *per se* has been rejected uniformly in the United States, it has won judicial approval in England, where the courts have adopted the posture that the risk of driving without a restraint is always an unreasonable one and as a consequence, it is *always* negligence to fail to use an available seat belt. *Froom v. Butcher*, [1976] Q.B. 2, [1975] 3 All E.R. 520 (C.A.).

<sup>233</sup> The court restricted the availability of common law contributory negligence as an affirmative defense to those situations where the negligence caused the accident itself rather than simply enhancing the injuries. 35 N.Y.2d at 451, 323 N.E.2d at 168.

<sup>234</sup> *Id.* at 449-50, 323 N.E.2d at 167.

<sup>235</sup> *Id.* at 452, 323 N.E.2d at 168 (emphasis in original).

preventing injuries."<sup>236</sup> The interplay of such considerations with principles applied in crashworthiness cases measuring manufacturers' responsibilities, is such as to require as a matter of logic and equity, that evidence of non-use be admitted. Since the manufacturer "is under a duty to use reasonable care in the design of its vehicle to avoid subjecting the user to an unreasonable risk of injury in the event of collision,"<sup>237</sup> it is no less proper for a court to permit a jury to determine "whether the plaintiff has exercised ordinary care, not only to avoid injury to himself, but to mitigate any injury he would likely sustain."<sup>238</sup> In this context it makes no substantive difference whether the jury's consideration of non-use be designated as mitigation or as avoidable consequences . . . the doctrines are virtually identical.<sup>239</sup>

## VII. COMPARATIVE NEGLIGENCE

Not surprisingly, the seat belt defense has had its greatest acceptance in those jurisdictions which have adopted principles of comparative negligence. The Wisconsin case of *Bentzler v. Braun*,<sup>240</sup> generally credited with being the earliest major judicial approval of the seat belt defense, arose in a comparative negligence jurisdiction. The logic of admitting evidence of non-use as one factor in a comprehensive jury evaluation of all the elements of fault in an accident is clear,<sup>241</sup> especially considering the need for refocusing the "reasonable man" standard in the seat belt context.<sup>242</sup> Whether the growth of comparative negligence statutes "will ineluctably lead to the adoption of the seat belt rule as a significant element of the damage apportionment equation"<sup>243</sup> may be

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<sup>236</sup> *Id.*, 323 N.E.2d at 168. See also *Frozzitta v. Incorporated Village of Freeport*, 57 A.D.2d 827, 394 N.Y.S.2d 64 (1977); *Uribe v. Armstrong Rubber & Tire Co., Inc.*, 55 A.D.2d 869, 390 N.Y.S.2d 419 (1977).

<sup>237</sup> *Larsen v. General Motors Corp.*, 391 F.2d 495, 502 (8th Cir. 1968).

<sup>238</sup> *Spier v. Barker*, 35 N.Y.2d at 450, 323 N.W.2d at 167. See also *Mount v. McClellan*, 91 Ill. App. 2d 1, 234 N.E.2d 329 (1968).

<sup>239</sup> Decisions frequently acknowledge this fact by combining reference to the two doctrines in the same statements. See, e.g., *Spier v. Barker*, 35 N.Y.2d 444, 363 N.Y.S.2d 916, 323 N.E.2d 164 (1974). In *Caiazza v. Volkswagenwerk, A.G.*, 468 F. Supp. 593 (E.D.N.Y. 1979), the court stated: "The failure to use the seat belts was properly considered in mitigation of the damages . . . on the familiar principle that a tortfeasor is liable for the proximate but not for the avoidable consequences of his tort." *Id.* at 606.

<sup>240</sup> 34 Wis.2d 362, 149 N.W.2d 626 (1967).

<sup>241</sup> Since the adoption of comparative negligence in England, the enabling statute has provided that a finding of contributory negligence will not defeat a claim but will merely cause its equitable apportionment. The Law Reform (Contributory Negligence) Act of 1945, (8 & 9 Geo. 6, c. 28). See also, note 245 *infra* and accompanying text.

<sup>242</sup> See notes 253-66 *infra* and accompanying text.

<sup>243</sup> *Hoglund and Parsons, supra* note 189, at 14-15.

open to argument, but the clearly discernable trend is toward such adoption.<sup>244</sup> Whether the application of the seat belt defense in comparative negligence cases will ultimately lead to decisions which apportion damages for failure to use an available belt also remains to be seen. Early English experience with the question suggests that extreme results will arise only in the unusual case where the expert testimony overwhelmingly establishes that the use of the seat belt would have prevented virtually all of the injuries sustained.<sup>245</sup> The consequences of the adoption of the seat belt defense may also depend significantly upon whether the form of comparative negligence in force in a given jurisdiction is "pure" or "modified." In pure comparative negligence jurisdictions, each party may recover for the negligence of the other, regardless of the percentages of relative fault. In modified comparative negligence jurisdictions, a claimant may be barred from any recovery if found to be more than fifty percent at fault.<sup>246</sup> The relationship of comparative fault principles and strict tort liability principles has not yet been fully appreciated.<sup>247</sup>

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<sup>244</sup> See, e.g., *Melia v. Ford Motor Co.*, 534 F.2d 795 (8th Cir. 1976) (Nebraska law); *Daly v. General Motors Corp.*, 144 Cal. Rptr. 380, 575 P.2d 1162 (1978); *Roberts v. May*, 583 P.2d 305, (Colo. App. 1978); *Speir v. Barker*, 35 N.Y.2d 444, 363 N.Y.S.2d 916, 323 N.E.2d 164 (1974); *Bentzler v. Braun*, 34 Wis. 2d 362, 149 N.W.2d 626 (1967).

<sup>245</sup> See, e.g., *Pasternak v. Poulton*, [1973] 1 W.L.R. (Q.B.). In *Pasternak*, the plaintiff passenger did not wear an available seat belt which she did not know was present. She was assessed only a 5% responsibility for having failed to use the seat belt. In *Toperoff v. Mor* [1973] R.T.R. 419, reported in Kerse, *Some Recent Decisions on Wearing Seat Belts*, 117 SOL. J. 625 (1973), the plaintiff was charged with a reduction in damages of 25% when, after having been asked to wear the seat belt and having done so prior to a brief stop following which it was not reaffixed, the plaintiff was injured. The defendant driver had reaffixed the seat belt and had not been seriously injured. See, also *McGhee v. Frances Shaw & Co., Ltd.* [1973] R.T.R. 409 (33 1/3% mitigation); *Parnell v. Shields*, [1973] R.T.R. 414 (20% mitigation).

<sup>246</sup> For an example of "pure" comparative negligence, see WASH. REV. CODE §§ 4.44.010, .900, .910 (Supp. 1973), and for a "modified" form, see WIS. STAT. ANN. § 331.045 (West 1958). A majority of states have now adopted comparative fault statutes, the most recent appears to be OHIO REV. CODE § 2315.19 (Page 1980). At least three states have adopted comparative fault through judicial action. See *Li v. Yellow Cab Co.*, 13 Cal.2d 804, 532 P.2d 1226, 119 Cal. Rptr. 858 (1975); *Hoffman v. Jones*, 280 So.2d 431 (Fla. 1973); *Placek v. City of Sterling Heights*, 405 Mich. 638 (1979).

<sup>247</sup> The court in *Melia v. Ford Motor Co.*, 534 F.2d 795 (8th Cir. 1976), failed to fully grasp this issue when it declared:

We additionally observe the application of Nebraska's comparative negligence statute would, under the language of the statute, be extremely confusing and inappropriate in a strict liability case. Under Nebraska law in order for the comparative negligence statute to be invoked the plaintiff's negligence must be slight and the defendant's negligence gross in comparison . . . In strict liability cases proof of negligence or

It may also be observed that in those cases where the seat belt defense has been admitted as part of a comparative fault analysis, courts have not been troubled by the canard frequently used by opponents of the seat belt defense, i.e., that a jury would have to engage in too much speculation to determine the extent of injuries which the use of an available seat belt would have prevented or reduced.<sup>248</sup> The reduction of injuries resulting from use of a seat belt is certainly no more speculative than is the enhancement of injuries from an alleged design defect, especially where an allegedly defective-designed seat belt is the mechanism of injury.<sup>249</sup>

With the advances in recent years in the fields of accident reconstruction and biomechanics, apportionment of damages via the seat belt defense can no longer properly be claimed to be speculative. In a concurring opinion in *Amend v. Bell*,<sup>250</sup> Washington Supreme Court Justice Dolliver took issue with the majority's claim that allowance of the seat belt defense would require an unacceptable "battle of experts" and would involve jury speculation as to damage apportionment.

The spectre raised by the majority as to "a veritable battle of experts" is just that: a ghostly apparition with no substance. Surely the testimony of experts on seat belts would cause no more "substantial speculation by the trier of facts" than numerous other factual issues which are routinely addressed.<sup>251</sup>

The issues raised by this defense are no more complex or speculative than other issues to which juries are routinely submitted. The foundation of comparative fault concepts rests on the premise that juries, when provided with adequate evidence, are capable of properly apportioning fault.

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degree of fault is not required . . .

*Id.* at 802 (citations omitted). *Contra*, *Daly v. General Motors Corp.*, 144 Cal. Rptr. 380, 575 P.2d 1162 (1978) (applying comparative fault to a strict liability action and, thereby placing the concepts into a proper perspective).

<sup>248</sup> See, e.g., *Kleist*, *supra* note 188, at 619. Such arguments are substantially weakened, of course, by the further development in the years since 1967 of irrefutable evidence of the value of seat belts in saving lives and reducing serious injuries. See notes 64-80 *supra* and accompanying text.

<sup>249</sup> In *Austin v. Ford Motor Co.*, 86 Wis.2d 628, 273 N.W.2d 233 (1979), the plaintiff was permitted to plead and prove, and the jury was held to have been justified in finding, that the injury to plaintiff was five times as severe as it would have been, had the seat belt not been defective. No logic can justify a contention that a jury is competent to determine that injuries are enhanced by a factor of five if a seat belt does not work but is not competent, because it would engage in speculation, to determine that injuries would have been reduced by that same factor of five if the available seat belt had in fact been used.

<sup>250</sup> 80 Wash.2d 124, 570 P.2d 138 (1977).

<sup>251</sup> *Id.* at 135, 570 P.2d at 144.

## VII. OBSERVATIONS: THE REASONABLE PERSON—JUDICIAL NOTICE

When this article was conceived, no consideration was given to presenting a discussion of the respective roles of judge and jury. As the article developed, two questions continuously intruded: what is a reasonable person, and could judicial notice be of assistance in design-defect seat belt litigation? The tentative answers to these questions suggest that they be considered in conjunction with the related question of what constitutes a proper jury charge. Although the responses cannot be fully presented herein, some initial buoys may help future pilots in these relatively uncharted waters.<sup>252</sup>

The reasonably prudent person has been with us for generations. Its fictional ancestry and position in the law are without peer. Any review of design-defect litigation opinions discloses consistent reference to both the "reasonable man" and reasonableness standards. In seat belt defense cases, the issue is more specific—would a reasonably prudent person wear an available seat belt? In almost all cases permitting the seat belt defense, this question has been treated as a question of fact for the jury.<sup>253</sup>

It appears that this question should not be treated as a factual issue. There is no factual issue. The evidence of seat belt efficacy is overwhelming<sup>254</sup> and the average person clearly comprehends that seat belts prevent or reduce accident related injuries.<sup>255</sup> In light of these facts, the court should instruct the jury that a reasonably prudent person would wear a seat belt. The instruction should be followed by other instructions detailing the limited effect the jury should give to this fact and legal conclusion.<sup>256</sup> Of course, the jury should also be instructed that they cannot ordinarily find for the defendant simply because the plaintiff failed to wear an available belt, but that they may do so only if that failure was the proximate cause of the total injuries sustained by the plaintiff. Additional limiting charges, dependent upon the legal theory under which the seat belt defense was presented, might also be

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<sup>252</sup> Although both the reasonable man concept and the principle of judicial notice are well known, neither appears to have been considered in the context suggested.

<sup>253</sup> See, e.g., *Melia v. Ford Motor Co.*, 534 F.2d 795 (8th Cir. 1976); *Wilson v. Volkswagen of America, Inc.*, 445 F. Supp. 1368 (E.D. Va. 1978).

<sup>254</sup> See notes 64-80 *supra* and accompanying text.

<sup>255</sup> See notes 108-19 *supra* and accompanying text. As noted therein, almost 90% of licensed drivers believe that seat belts prevent injury in motor vehicle accidents. In some instances, a plaintiff can be made to admit such knowledge.

<sup>256</sup> For discussion purposes, it is assumed that sufficient competent evidence of injury prevention or reduction in the specific circumstances has been introduced. Absent such evidence the seat belt defense could not be raised. Utilization of the existence of a seat belt restraint system as some evidence that the vehicle was properly designed may also be introduced. See notes 174-85 *supra* and accompanying text.

proper.<sup>257</sup> In any event, the jury would commence its deliberations with an understanding that the plaintiff in this respect, failed to meet the "reasonable man" standard of conduct.

Precisely such an approach was taken by a trial court judge in a non-crashworthiness case.<sup>258</sup> The trial court instructed the jury:

Now, as to any mitigation of damages, you are instructed that it is not negligence on the part of Mr. Thomas to not wear a seat belt. By reason of the fact that he didn't wear one doesn't mean that he was negligent.

However, if you determine under all the credible evidence and reasonable inferences from the evidence in this case that Mr. Thomas' failure to wear a seat belt substantially contributed to the injuries and damages alleged to have been sustained by him or that any portion thereof could have been avoided by the use of the seat belt, then you may deduct from any amount that you may make any amount for the injuries and damages which you find could have been so avoided.<sup>259</sup>

To justify such a jury instruction, the court will have to place non-use of seat belts into perspective. The majority of Americans, perhaps as many as eighty-six percent, habitually fail to use available seat belts.<sup>260</sup> Some will argue that if this many Americans act in a specified way, their conduct is automatically reasonable. The common law has consistently rejected such an argument. For over seventy-five years, the common law has applied the principle that prudent reasonable conduct is measured by what persons should do, as distinct from what persons actually do.<sup>261</sup> A federal court of appeals recently addressed the question in a decision dealing with an action brought pursuant to the Occupational Safety and Health Act.<sup>262</sup> The court held:

The "reasonable man" is, of course, a fictional character borrowed from tort law wherein his conduct sets the standard

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<sup>257</sup> One such limitation might be to frame the instruction in "conditional" terms which create a presumption *e.g.*, "[U]nless the plaintiff has provided a valid reason for non-use of the available seat belt, you are to find that plaintiff's failure to do so was unreasonable." Valid reasons could include physical (medical) factors or other circumstances such as are described in seat belt use statutes, *e.g.*, P.R. LAWS ANN. tit. 9, § 1212(b) (1976). Reasonableness considerations should not include the length of the trip, type of road, discomfort or fear of entrapment.

<sup>258</sup> *Thomas v. Grant*, No. 38422 (8th Dist. Ohio Ct. App., May 17, 1979) (unpublished journal entry and opinion).

<sup>259</sup> *Id.* at 4.

<sup>260</sup> See note 62 *supra*.

<sup>261</sup> See *Texas and Pacific Ry. Co. v. Behymer*, 189 U.S. 468, 470 (1903). See also, *Thompson v. Ohio Fuel & Gas Co.*, 9 Ohio St. 2d 116, 224 N.E.2d 131 (1967); *Campbell v. Hughes Provision Co.*, 87 Ohio App. 151, 94 N.E.2d 273 (1949).

<sup>262</sup> *B & B Insulation, Inc. v. O.S.H.R.C.*, 583 F.2d 1364 (5th Cir. 1978).

below which behavior constitutes negligence. Because the reasonable man personifies the community ideal of reasonable behavior, evidence of customary conduct of those similarly situated may be probative in determining his behavior . . . *Custom is, however, not dispositive in negligence actions. "[W]hat ought to be done is fixed by a standard of reasonable prudence, whether it usually is complied with or not."*<sup>263</sup>

At best, the failure of others to wear seat belts is a circumstance to be considered by the jury. Still, when such conduct creates an extraordinary risk of harm which could be prevented without cost or effort, the circumstances cannot justify the behavior. Thus, although such a failure is not negligence per se,<sup>264</sup> it is unreasonable conduct and the jury should be so instructed.<sup>265</sup>

To so charge the jury requires either that the defendant submit evidence to support its assertions of efficacy and knowledge or that the court judicially notice such fact. No decision to date has taken judicial notice of seat belt efficacy, perhaps because of the belief that seat belts can cause injury in some circumstances.<sup>266</sup> However, seat belts prevent and reduce far more injuries than they cause.<sup>267</sup> Judicial notice of the benefits of seat belt use does not require that the court refuse to allow a jury to weigh the relative merits of use in the *specific situation*. Such judicial notice would make possible a more economical use of trial time by precluding the need to present a maze of scientific literature and expert testimony to prove a point already well established. In addition, if notice is not taken and the defendant presents proof of seat belt efficacy, the adversary would probably spend additional time in rebuttal presenting the "seat belt syndrome" concepts.<sup>268</sup> The effect would be unnecessary confusion, overemphasis on the general instead of the specific aspects of the relevance of seat belt use and potentially inconsistent decisions.

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<sup>263</sup> *Id.* at 1370 (emphasis added).

<sup>264</sup> See note 232 *supra*.

<sup>265</sup> To prevent a "de facto" or back door absolute contributory negligence defense, the instruction should specify that the plaintiff's conduct does not relieve defendant of liability beyond the extent to which defendant, by a preponderance of the evidence, has established that seat belt use would have prevented or reduced injuries. See notes 258-59 *supra*. The jury could, however, find liability while at the same time finding that no damages are proper under the circumstances.

<sup>266</sup> See notes 85-98 *supra*. Other reasons for such a failure include the possibility that inadequate data was presented to the court, failure to seek judicial notice by proper motion and the court's traditional unwillingness to remove "negligence" issues from the trier of fact.

<sup>267</sup> See notes 64-80 *supra* and accompanying text.

<sup>268</sup> See notes 85-98 *supra* and accompanying text.



If the court judicially notices that seat belts generally provide benefits and then charges the jury that a reasonably prudent person would wear an available seat belt, the jury function is not invaded. The court is, in effect, instructing the jury that reasonably prudent conduct may have reduced the likelihood of harm. The defendant must still submit competent evidence to establish that the seat belt would have prevented or reduced the specific injuries sustained in the accident. The jury alone will determine the ultimate issues of liability and damages.

Certainly the issue of whether a reasonable person would wear an available seat belt has been a traditional jury question. The continuation of this approach is not necessary and its abolition would foster decisions in accord with modern scientific, lay and medical knowledge. When the traditional jury question is asked, its answer depends solely on what facts the jury will take into account in regard to seat belt efficacy.

A strong argument can be made that judicial notice of seat belt efficacy is proper notice of an adjudicative fact under the Federal Rules of Evidence.<sup>269</sup> It is worthy of note that some courts have considered the definition of adjudicative facts to be something of a non-sequitur and have resorted to common sense. One opinion dealing with the combustibility of charcoal when doused with a fire starter,<sup>270</sup> placed the facts and judicial notice into such a common sense perspective, declaring: "These are all matters of such common knowledge that the court feels obliged to take judicial notice of them. . . . [T]hese facts are so well-known and not open to challenge as to require that they be judicially noticed."<sup>271</sup>

The Federal Rules of Evidence do not address the propriety of taking judicial notice of legislative facts.<sup>272</sup> This issue is resolved by the com-

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<sup>269</sup> FED. R. EVID. 201.

<sup>270</sup> *Goodman v. Stalfort Inc.*, 411 F. Supp. 889 (D.N.J. 1976).

<sup>271</sup> *Id.* at 894.

<sup>272</sup> Relying upon the terminology expressed by Professor Davis in *An Approach to Problems of Evidence in the Administrative Process*, 55 HARV. L. REV. 364, 404-07 (1942), and other contributions of Professor Davis, the Advisory Committee Note to FED. R. EVID. 201 distinguishes adjudicatory from legislative facts: "Adjudicative facts are simply the facts of the particular case. Legislative facts, . . . are those which have relevance to legal reasoning and the lawmaking process, whether in the formulation of a legal principle or ruling by a judge or court or in the enactment of a legislative body." FED. R. EVID. 201, Advisory Comm. Note. Whether adjudicative facts serve as the exclusive basis for judicial notice in federal practice is discussed generally in 9 C. WRIGHT & A. MILLER, *FEDERAL PRACTICE AND PROCEDURE*, § 5103 (West 1977). See also, ROTHSTEIN, *supra* note 151, Practice Commentary at 36. ("Excluded from coverage is judicial notice of law, 'legislative' facts, and of 'non-evidence' facts.") Distinctions between legislative and adjudicative facts are also noted in *United States v. Gould*, 536 F.2d 216 (8th Cir. 1976); *State v. Gorham*, 536 F.2d 410 (D.C. Cir. 1976); *Goodman v. Stalfort, Inc.*, 411 F. Supp. 889 (D.N.J. 1976).

mon law which permits judicial notice of legislative facts.<sup>273</sup> Whether seat belt efficacy is a "legislative" or an "adjudicatory" fact is actually an irrelevant exercise in legal sophistry. The answer is the same in both cases.

Whether pursuant to the federal rule approach or through common law, a judicially noticed fact must be generally known within the territorial jurisdiction of the court or be capable of accurate and ready determination by resort to unquestionable authority.<sup>274</sup> The common law approach was clearly expressed in *Kennedy v. Parrott*.<sup>275</sup> "A judge or court may take judicial notice of any fact in the field of any particular science which is either so notoriously true as not to be the subject of reasonable dispute or is capable of demonstration by resort to readily accessible sources of indisputable accuracy."<sup>276</sup>

The fact of seat belt efficacy is well known within any judicial territory and is capable of ascertainment through indisputable authority. The evidence could be noticed through either permissible means, as both bases for judicial notice are met. It may be argued that if the court must take judicial notice through the "ascertainment" approach, the evidence to support the fact is overly complex and comprehensive thereby precluding the ability required. This argument is invalid. The court could reach its decision by viewing a single volume authority constituting a compilation of studies.<sup>277</sup> Even if this does not constitute the type of immediate ascertainment desired, another alternative is available. A formal motion can be brought by the party seeking judicial notice of seat belt efficacy. This motion could be supported by technical data in summary form, possibly including a comprehensive bibliography.

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<sup>273</sup> See generally, AM. JUR.2d, *Evidence*, §§ 14-38 (1967); MCCORMICK, *supra* note 137, § 331. The concurring opinion of Justice Frankfurter in *Dennis v. United States*, 341 U.S. 494 (1951), made forceful use of legislative facts. *Id.* at 517-61 (Frankfurter, J., concurring). The opinion in *Brown v. Board of Education of Topeka*, 347 U.S. 483 (1954), made extensive use of judicial notice of facts without distinguishing between legislative and adjudicative facts, although many of the facts noticed might have been classified as "legislative." See also, *Jamison v. Kline*, 454 F.2d 1256 (3d Cir. 1972); *Mobile Towing & Wrecking Co. v. Dredge*, 299 F. Supp. 358, 362 n.4 (N.D. Fla. 1969).

<sup>274</sup> *E.g.*, FED. R. EVID. 201(b); ANN. CAL. EVID. CODE §§ 451, 452; *Garner v. First National City Bank*, 465 F. Supp. 372, 382 n.12 (S.D.N.Y. 1979); *Haye v. United States*, 461 F. Supp. 1168, 1174 (D. Cal. 1978); *Chapman v. Gerard*, 341 F. Supp. 1170 (D. Vir. Is.), *aff'd*, 456 F.2d 577 (1970); *United States v. Kansas Gas & Electric Co.*, 215 F. Supp. 532 (D. Kan. 1963). Similar holdings are found in state court decisions. See generally, MCCORMICK, *supra* note 144, §§ 330-332.

<sup>275</sup> 243 N.C. 355, 90 S.E.2d 764 (1956).

<sup>276</sup> *Id.* at 357, 90 S.E.2d at 756 (emphasis added).

<sup>277</sup> *E.g.*, SYMPOSIUM, *supra* note 26; PROCEEDINGS OF THE 6TH INTERNATIONAL CONFERENCE OF THE INTERNATIONAL ASSOCIATION FOR ACCIDENT AND TRAFFIC MEDICINE, (1977).

Such a motion could be filed and ruled upon well before trial and, if granted, would make trial management for the court, parties and jurors far easier.

As a practical matter, judicial notice of seat belt efficacy will serve to make judicial and jury decisions more consistent. Utilization of the suggested jury charge will move the decision—making process from the conduct aspect of plaintiff's behavior, to the effects of such behavior. An identical approach is used in determining defendants' culpability under strict tort liability or breach of warranty actions. Evidence of seat belt efficacy, in general, is supportive of the specific evidence needed to establish the seat belt defense. It is not collateral to the ultimate issue or issues. Without the general background presented in the form of testimony or jury instruction, a jury would be hard pressed to properly decide the case as it could not fully evaluate the seat belt evidence.

For both legal and practical reasons, a common sense approach to the seat belt defense suggests that judicial notice be taken of seat belt efficacy. With this fact noted, a court should determine that no reasonable juror would find it reasonably prudent not to wear an available seat belt. If this premise is correct, it becomes appropriate for the court to decide one aspect of the case as a matter of law, *i.e.*, that a reasonably prudent person would wear an available seat belt.

#### IX. CONCLUSION

Data from the realms of science, medicine and law all indicate that a reasonably prudent person should make use of an available restraint mechanism. Seat belt use will save thousands of lives and prevent tens of thousands of serious injuries annually. The legislative and judicial branches of the government should take all possible steps to promote seat belt use. In this light, mandatory seat belt use legislation and the application of the seat belt defense make sense.

### *Technical Appendix*

The physical forces that act on an automobile during a collision sequence also determine occupant kinematics. Two frequently occurring accident patterns—a frontal impact into a barrier and an intersection collision—may be used to illustrate this point.

#### *A. Frontal Impact*

Extensive information about frontal impacts was accumulated in a Department of Transportation testing program conducted in 1971 and 1972.<sup>1</sup> The experiments were conducted at an impact speed considerably higher than that required by the federal government for testing passenger cars.<sup>2</sup> Since the primary design goal for the test vehicles used in the study was occupant protection, it is reasonable to assume that greater vehicle deformation and deceleration forces would occur in a production vehicle.

Experimental safety vehicles (ESV) were built for the study by AMF, Inc. (AMF) and Fairchild Industries (FI).<sup>3</sup> The AMF and FI vehicles, with test weights of 6,930 and 6,353 pounds respectively,<sup>4</sup> performed in a remarkably similar fashion. The AMF ESV collided with the barrier at 47.7 miles per hour, resulting in a frontal dynamic crush of 2.3 feet, but causing no passenger compartment intrusion.<sup>5</sup> The FI ESV impacted the barrier at 48.9 miles per hour, resulting in a frontal dynamic crush of 2.4 feet, again without passenger compartment intrusion.<sup>6</sup> The average deceleration force in the AMF ESV was 34.6 G's, which compared to an average deceleration force of 32.7 G's in the FI ESV.<sup>7</sup> Peak deceleration forces in the AMF ESV were reached when approximately six inches of vehicle deformation occurred and were measured at approximately 43 G's.<sup>8</sup> In the FI ESV a maximum deceleration of approximately 42 G's was attained at a deformation point of 2.2 feet.<sup>9</sup>

Fully instrumented, 50th percentile male anthropomorphic dummies

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<sup>1</sup> N. Stahler and F. Arndt, *ESV Test Methodology and Results*, Society of Automotive Engineers (SAE) Paper No. 730590 (1973).

<sup>2</sup> An impact speed of 30 miles per hour for frontal barrier impact tests is specified in Federal Motor Vehicle Safety Standard (F.M.V.S.S.) 208, 49 C.F.R. § 571.208 (1979).

<sup>3</sup> N. Stahler and F. Arndt, *supra* note 1 at 1.

<sup>4</sup> *Id.* at 6 (Table 7).

<sup>5</sup> *Id.*

<sup>6</sup> *Id.*

<sup>7</sup> *Id.*

<sup>8</sup> *Id.*

<sup>9</sup> *Id.* (Figure 7).

<sup>9</sup> *Id.* (Figure 8).

were used to measure the injury potential of the collisions.<sup>10</sup> While the vehicle structures experienced the above-mentioned forces, the acceleration forces on the dummy occupants reached over 50 G's in less than ten milliseconds in the AMF ESV and over 48 G's within 70 to 80 milliseconds in the FI ESV.<sup>11</sup> Thus, in terms of the effect of vehicle dynamics on occupant kinematics the major injury-producing potential began and ended in less than one-tenth of a second.

The dynamics of a high speed barrier impact are overpowering. At a speed of 60 miles per hour a vehicle is moving at 88 feet per second, yet when that vehicle impacts against a fixed barrier, it comes to a virtually instantaneous stop. Vehicle deceleration forces will be on the order of magnitude of 25 G's.<sup>12</sup> The forces imposed upon front seat unrestrained occupants will be considerably greater. Assuming the driver's torso is a typical eleven inches from the steering wheel, he will strike the steering wheel in less than 2/100ths of a second. The deceleration force involved is almost 49 G's.<sup>13</sup> The normal passenger will strike the dash and complete dash deformation in 1/100th of a second, and be subjected to a deceleration force in excess of 100 G's. In either case the vehicle dynamics create fatal impact forces in less than 2/100ths of a second.<sup>14</sup>

### *B. Intersection Collision*<sup>15</sup>

Intersection collisions may occur in a variety of fashions. These variations are the product of a combination of factors such as last-second driver reaction; tire and road conditions; vehicle strength, weight, and speed; and the point and angle of impact. For purposes of illustration, assume a factual situation with the following characteristics: an impact speed of 30-35 miles per hour; no significant driver reactions; a striking (bullet) vehicle weight of 5,000 pounds and 3,000 pounds for the struck (target) vehicle; an angle of impact of 90 degrees; and an impact point on the left side of the target vehicle's "A" pillar.

In the first milliseconds, the bullet vehicle will sustain a minimal but immediate deceleration, coupled with front end deformation. Simultaneously, the target vehicle will sustain more extreme deformation to its left quarter panel, "A" pillar, door hinges and door areas. In-

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<sup>10</sup> *Id.* at 5.

<sup>11</sup> *Id.* at 7 (Figures 9 and 10).

<sup>12</sup> See British Columbia Road Safety Coordinating Council, *Seat Belt Presentation* (Feb. 9, 1977) (pamphlet on file with the author), at 4 (Exhibit 4).

<sup>13</sup> *Id.*

<sup>14</sup> *Id.*

<sup>15</sup> The description which follows draws upon the author's experience and represents a composite of expert testimony given in connection with a significant number of litigated matters. The testimony was premised upon the laws of physics, applicable mathematical computations, utilization of computerized reconstruction programs (SMAC) and the experience of the experts involved.

stead of decelerating, the target will accelerate due to the force generated by the impacting bullet vehicle, and change its direction from straight forward to forward-right.

Within the next 200-500 milliseconds, the potential for injury is at its highest. If the vehicles separate from each other more rapidly, the peak potential will be reached in an even shorter time. Once the vehicles separate the likelihood of injury is lessened and falls off rapidly as the vehicles move to their respective points of rest. However, injury potential is present until the final point of rest is reached.

In less than 20 milliseconds, after initial vehicle contact, the target vehicle will have gained velocity and had its direction modified. In this illustration, the bullet vehicle generates more force than the target vehicle because it has a greater mass.<sup>16</sup> The bullet vehicle will move almost directly forward, deflected slightly to the left due to the resistance of the struck vehicle. The target vehicle will move almost 90 degrees to the right and the vehicles will begin to line up in parallel positions. While at some early point during this period the vehicles will be travelling at identical speeds, the speed of the bullet vehicle will most likely soon surpass that of the target. This physical fact may be important if the target vehicle door opens during this phase of the collision sequence.<sup>17</sup> If the door opens, it will almost instantaneously be contacted by the side of the bullet vehicle. This contact will either close the door or open it further depending on the precise location of the vehicles and their relative speeds, but will have little effect on the continuing dynamics. The vehicles will come into a parallel mode and continue past parallel so that the right rear of the bullet vehicle will strike the left rear of the target vehicle creating a "side-slap." This second vehicle contact (third if there is door contact) will again increase the velocity of the target vehicle and add a force causing it to revolve. Dependent upon speeds, tires, damage and other factors, the vehicle may spin 180 degrees and leave the impact point backwards or may spin a full 360 degrees or more. After side-slap, vehicle contact ends and the vehicles will "roll-out" to their final positions of rest which may be 200 feet or

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<sup>16</sup>  $F = Ma$ ; Force = Mass times Acceleration. See R. RESNICK and D. HALLIDAY, PHYSICS (1966) at 85. It is the effect represented in this formula (as well as design differences) that tends to make smaller vehicles less safe in collision circumstances than larger vehicles. Nevertheless, the Director of the Highway Research Center, University of North Carolina, has "... no doubt ... that restraint systems even in small cars, are highly effective in preventing serious injury and death in the event of a crash." Campbell, *Seat Belt Effectiveness*, 79 INTERNATIONAL SYMPOSIUM ON SEAT BELTS 166 (1979). Furthermore, Mr. Campbell believes that as the number of small vehicles on the road increases the death rate will rise, unless offset by greater utilization of seat belt restraint systems.

<sup>17</sup> If there is a partial ejection at this point a severe blow to the head is possible. If there is a total ejection the occupant may be crushed between the vehicles. A window ejection, though less common, is also possible in these circumstances.

more from the initial impact point. The roll-out will be completed in a time-frame of approximately 3-8 seconds, and the entire collision sequence from first impact to final resting point will normally occur in under 8 or 9 seconds. During these vital moments, especially during the first two seconds or less, the occupant's kinematics are dictated by vehicle dynamics. Injury to an unrestrained occupant is virtually certain.

